UNITED STATES COAST GUARD

MANUAL FOR LIFEBOATMEN AND ABLE SEAMEN

AUGUST : : : : 1944

B19

Property of Gleason
P082-03

Q. Explain the use of the line-carrying gun by the United States Coast Guard in effecting a rescue.

A. If your vessel is stranded and a shot with a small line is fired over it, get hold of the line and haul on board until you get a tailblock with an endless line rove through it; make the tailblock fast to the lower mast, well up, or in the event the masts are gone, to the best place to be found; cast off small shot line, see that rope in block runs free, and make a signal to shore. A hawser will be bent to the endless line on shore and hauled off to your ship by the life-saving crew. Make hawser fast about 2 feet above the tailblock and unbend hawser from endless line. See that rope in block runs free and show signal to shore. Life-savers on shore will then set hawser taut and, by means of the endless line, haul off to your ship a breeches buoy. Let one man get clear into the breeches buoy, thrusting his legs through the breeches; make signal to shore as before, and he will be hauled ashore by the life-savers and the empty buoy returned to the ship.

Q. How would you land a lifeboat on the beach with a strong wind on shore, a high sea, and heavy surf?

A. If it is possible for the lifeboat to live in the sea, it is probably better to wait outside the breakers until the sea moderates. There are many cases where lives have been lost in attempting to go through surf at a time when the boat was perfectly safe outside the breakers.

Watch carefully when approaching and find a place where the surf is least heavy; head directly for the beach, towing the sea anchor over the stern spreading oil, and having the oarsmen pull an easy stroke to keep a strain on the dragline so as to prevent the stern from being thrown around by the sea and the boat capsized. If necessary, use additional oil to prevent the seas from combing and breaking. When on the last sea and making the beach, have the oarsman pull vigorously so that the boat will go up on the beach as far as possible and will not capsize. A bucket or any drag can be used instead of a sea anchor. An anchor can also be used by dropping

it outside the breakers and keeping a strain on the anchor line as you go through the surf, using it to hold the bow or stern (as the case may be) up to the sea. If none of these are available, pull in close to the breakers, watch for a lull, and then back the boat in, pulling toward each sea as it breaks. Do not let her fall broadside to, or the boat will be swamped.

Q. In a lifeboat under sail, you are running before a gale in a heavy sea with night coming on and it becomes too dangerous to run, what would you do?

A. Down sail and mast and heave to, out sea anchor and ride to that, using oil on the water.

Q. In a motor lifeboat, how does the torque of the propeller affect the boat when the ordinary right-handed marine engine is used?

A. With the helm amidships, and the engine running ahead, the boat's head gradually goes to port. With the helm amidships and engine going astern, the boat's stern goes to port rapidly. A small amount of right rudder is necessary to counteract this tendency when going ahead. As the effect of the torque is greater when going astern, advantage may be taken of this tendency when maneuvering in close quarters, by turning the boat to the right. By going ahead with right rudder, and astern with left rudder, and repeating the process, the stern is sheered rapidly to port and the boat is quickly turned. In handling lifeboats, it is best to use the engines at a moderate speed both ahead and astern while maneuvering in order to get the maximum benefit in steering of the action of the propeller stream against the rudder.

Q. Is the action of the rudder on a motor lifeboat more pronounced than on a large vessel?

A. It is, because of comparative rudder areas. A motor lifeboat can be steered when going astern much better than a vessel can.

Q. Describe a manually operated propeller as used in a lifeboat.

A. The manually operated propeller eliminates the use of oars. The usual clutch, shafting, stuffing box, and propeller found in a motor lifeboat are used.

Bars run the length of the boat and are connected to the propeller shaft by a system of gears. Motive power is furnished by the movement of the bars in a fore-and-aft direction by the occupants of the boat (either passengers or crew), causing the propeller to rotate. The whole device is so constructed that no previous instruction is necessary for its operation. The direction of rotation of the propeller, and hence the direction of motion of the boat, may be reversed by means of the clutch.

Q. Which is the luff, foot, leach, head, tack, clew, peak, and throat of a fore and aft sail?

A. Luff—The fore part of any fore and aft sail.
Foot—The lower part.
Leech—The after part.
Head—The upper part.
Tack—The bottom of the luff where the tack goes or lower forward corner.
Clew—The after lower corner where the sheet hooks.
Peak—The upper after corner.
Throat—The forward upper corner.

Q. What kind of sails are lifeboats equipped with and how would you set them?

A. Lifeboats are generally equipped with lug sails. The dipping lug is the one most commonly used. To set a dipping lug, a yard which is attached to the head of the sail is hoisted up by a halyard on the lee side of the mast. The halyard is generally made fast to a strop located about ⅓ of the distance from the forward end of the yard. This strop is kept secured in this position in order that the sail will be always set properly. The tack is lightly made fast near the bow. After the sail has been hoisted on the halyards the tack is hauled down tight and the sheet hauled aft. Where a jib is carried, a standing lug is generally used. In this case the tack is made fast to a cleat on the mast or to a cleat on the thwart to which the mast is clamped. To set the jib the tack is made fast in the bow and you haul up on the halyard until the luff is tight. Then the sheet is hauled aft and made fast to a cleat located slightly abaft the mast and on the side of the gunwale. In

strong winds or squally weather a sheet should never be made fast but a turn taken around the cleat and held in hand ready for release. A sprit sail is sometimes provided for a lifeboat. This sail is kept spread by a spar with a pointed end which is stuck into the cringle at the peak of the sail, and the bottom part is carried in a strop near the tack at the mast.

Q. When running well off the wind or running free in a sailboat, how can a sudden gust of wind be met which threatens to capsize the boat?

A. Slack the sheet to spill the wind out of the sail and luff the boat up into the wind at the same time.

Q. Describe how you would take a reef in a lifeboat sail while underway in a fresh breeze.

A. When the boat has good headway and the men are assigned their duties and all seated, the boat is luffed, but not to the point where control and steerageway is lost. One hand lowers the halyards, as much as may be necessary, another hauls down on the luff and shifts the tack. The sheet is hauled in a little to let the men detailed for the reef points get hold of and gather in the foot. The sheet is then slacked and shifted, the reef points passed, the halyards manned, the sail hoisted, and the sheet trimmed. It is important to keep the boat under command while reefing and for this she must have way enough to obey her rudder.

If the crew is not well trained, it may be best to lower the sail entirely in order to take the reef, keeping her head into the wind by use of the oars.

PART III

ABLE SEAMEN

The deck department of any vessel is composed of the ordinary seamen, able seamen (including quartermasters, boatswains, and carpenters, who are simply specialized able seamen), radio operators, cadets, mates and the master.

Ordinary seaman is the entrance rating in the deck department and no professional or physical examination is required. However, applicants for certificates of service as ordinary seaman are advised to ascertain whether their physical condition, vision and hearing is such as to qualify them for service in the higher ratings of able seaman and mate. The Public Health Service will give voluntary examinations to such persons requesting same. After a period of training which varies according to the waters served on (as listed in Part I), an ordinary seaman is eligible for a rating as able seaman and lifeboatman. To be certificated as such, application must be made to the Officer In Charge, Marine Inspection, U. S. Coast Guard and the required physical, written, verbal and practical examinations satisfactorily passed.

An able seaman, so rated after 3 years' service on the seas or on the Great Lakes, is finally qualified to act in that capacity on any vessel anywhere. He is supposed then to be able to do any work necessary on deck on the vessel, no matter what it may be, and to be able to do it not only under favorable conditions, but also in any emergency which may arise. In other words, he should be able to perform any duty in the deck department except the actual navigation of the vessel.

After a still further term of service, an able seaman may, if qualified, take the required examination and obtain a mate's license. Thereafter, from time to time, after still further service, he may, in

the same way, obtain higher mate's licenses, and finally a master's license, which will permit him to assume the command of a vessel.

To become a good able seaman, it is necessary for a man to become thoroughly familiar with all branches of his profession, both by actual experience and by study. Nothing can take the place of the knowledge and training acquired by actually working on a vessel and meeting the different problems which arise. However, in connection with this practical training, a course of study is of great value and is highly recommended to any seaman who would be a master of his trade.

It is obvious that no short manual can hope to cover the entire field of seamanship satisfactorily. At the present time, there are on the market and readily obtainable several excellent books which thoroughly cover the subject. It is recommended that one or more of these be very carefully read and studied by every seaman.

HANDLING A BOAT UNDER OARS

The following commands apply when handling a boat under oars:

COMMAND	ACTION
STAND BY THE OARS.	Lift oars off thwarts, place blades flat on the forward gunwales, push oars forward until handle is over respective thwart.
UP OARS.....	Lift oars to vertical position. Trim blades fore and aft with handle resting on footings.
SHOVE OFF BOW....	Bowman lets go boat rope or sea painter or hauls in boat painter. Shoves off bow using boat hook.

COMMAND	ACTION
LET FALL.....	Let oars fall into rowlocks using crook of outboard arm to control the oars. Trim oars horizontally with blades trimmed fore and aft. Bowmen up oars before command of "let fall" or put out oars as soon thereafter as possible.
GIVE WAY.....	Blades of oars are moved forward and dipped about half way into water and stroke started. At end of stroke blades are feathered fore and aft and pushed forward and another stroke is made.
OARS	Complete the stroke and level the oars horizontally with blades trimmed fore and aft.
BACK WATER.....	Row in astern motion.
HOLD WATER.....	Complete the stroke, stop rowing, dip blade about half way into water and hold water to stop the way on the boat.
STERN ALL.....	When rowing in ahead motion, complete the stroke, then commence to back water, gradually increasing the depth of immersion of the blades.
WAY ENOUGH.....	When rowing in ahead motion, complete the stroke, raise oars with crook of elbow to about 30 degrees, swing blades forward and place oars in the boat.

COMMAND	ACTION
TOSS OARS	Complete the stroke, come to "Oars" raise the oars smartly to the vertical, rest handles on the footings and trim blades fore and aft.
IN BOWS.....	The bowmen complete the stroke, swing their oars forward and boat the oars, then stand by with boat hooks or to receive the sea painter or boat rope.
BOAT THE OARS.....	From "Oars" or from "Toss Oars," place the oars in the boat with blades forward.
OUT OARS.....	Place oars in rowlocks directly from the boated position or from "Stand by Oars" position.
STAND BY TO GIVE WAY.	Term used in racing. The blades are pushed to forward position and slightly dipped ready for an instant start.
GIVE WAY PORT, BACK WATER STARBOARD (OR VICE VERSA).	The orders are followed to turn the boat without making way ahead or astern.
GIVE WAY PORT, HOLD WATER STARBOARD (OR VICE VERSA).	This command will result in turning the boat resulting in slight headway.
TRAIL OARS	At this command, the blades of the oars are brought alongside the boat and left trailing in the water, in single banked boats fitted with swivel rowlocks.

All boat commands should be given in a sharp tone of voice and all the orders should be carried out smartly and in unison.

MARINER'S COMPASS

The card of the modern magnetic compass is graduated into 360°, starting from north or zero degrees and increasing around the circle to the right to east or 90°, south or 180°, west or 270° and back to north.

The compass card may also be graduated in points. There are 32 points, named as follows:

North	South
North by east	South by west
North northeast	South southwest
Northeast by north	Southwest by south
Northeast	Southwest
Northeast by east	Southwest by west
East northeast	West southwest
East by north	West by south
East	West
East by south	West by north
East southeast	West northwest
Southeast by east	Northwest by west
Southeast	Northwest
Southeast by south	Northwest by north
South southeast	North northwest
South by east	North by west

Each point is equal to 11¼ degrees of arc. The points are further divided into half and quarter points.

MARINER'S COMPASS

The Navy method of boxing the compass in quarter points, found in Table 2 of Bowditch Useful Tables, differs slightly from the Merchant Service method. Either method is acceptable on examinations.

The points and degrees of the compass as used in the Merchant Service.

Name.	Points.	Degrees.		
NORTH	0	0°	00′	00″
N ¼ E.	¼	2°	48′	45″
N ½ E.	½	5°	37′	30″
N ¾ E.	¾	8°	26′	15″
N by E.	1	11°	15′	00″
N by E ¼ E.	1¼	14°	03′	45″
N by E ½ E.	1½	16°	52′	30″
N by E ¾ E.	1¾	19°	41′	15″
NNE	2	22°	30′	00″
NE by N ¾ N	2¼	25°	18′	45″
NE by N ½ N	2½	28°	07′	30″
NE by N ¼ N	2¾	30°	56′	15″
NE by N.	3	33°	45′	00″
NE ¾ N.	3¼	36°	33′	45″
NE ½ N.	3½	39°	22′	30″
NE ¼ N.	3¾	42°	11′	15″
NE	4	45°	00′	00″
NE ¼ E.	4¼	47°	48′	45″
NE ½ E.	4½	50°	37′	30″
NE ¾ E.	4¾	53°	26′	15″
NE by E.	5	56°	15′	00″
NE by E ¼ E.	5¼	59°	03′	45″
NE by E ½ E.	5½	61°	52′	30″
NE by E ¾ E.	5¾	64°	41′	15″
ENE	6	67°	30′	00″
E by N ¾ N.	6¼	70°	18′	45″
E by N ½ N.	6½	73°	07′	30″
E by N ¼ N.	6¾	75°	56′	15″
E by N.	7	78°	45′	00″
E ¾ N.	7¼	81°	33′	45″
E ½ N.	7½	84°	22′	30″
E ¼ N.	7¾	87°	11′	15″
EAST	8	90°	00′	00″
E ¼ S.	8¼	92°	48′	45″
E ½ S.	8½	95°	37′	30″
E ¾ S.	8¾	98°	26′	15″
E by S.	9	101°	15′	00″
E by S ¼ S.	9¼	104°	03′	45″
E by S ½ S.	9½	106°	52′	30″
E by S ¾ S.	9¾	109°	41′	15″
ESE	10	112°	30′	00″
SE by E ¾ E.	10¼	115°	18′	45″
SE by E ½ E.	10½	118°	07′	30″
SE by E ¼ E.	10¾	120°	56′	15″
SE by E.	11	123°	45′	00″
SE ¾ E.	11¼	126°	33′	45″
SE ½ E.	11½	129°	22′	30″
SE ¼ E.	11¾	132°	11′	15″
SE	12	135°	00′	00″
SE ¼ S.	12¼	137°	48′	45″
SE ½ S.	12½	140°	37′	30″
SE ¾ S.	12¾	143°	26′	15″
SE by S.	13	146°	15′	00″
SE by S ¼ S.	13¼	149°	03′	45″
SE by S ½ S.	13½	151°	52′	30″
SE by S ¾ S.	13¾	154°	41′	15″
SSE	14	157°	30′	00″
S by E ¾ E.	14¼	160°	18′	45″
S by E ½ E.	14½	163°	07′	30″
S by E ¼ E.	14¾	165°	56′	15″
S by E.	15	168°	45′	00″
S ¾ E.	15¼	171°	33′	45″
S ½ E.	15½	174°	22′	30″
S ¼ E.	15¾	177°	11′	15″
SOUTH	16	180°	00′	00″

Name.	Points.	Degrees.		
SOUTH	16	180°	00′	00″
S ¼ W.	16¼	182°	48′	45″
S ½ W.	16½	185°	37′	30″
S ¾ W.	16¾	188°	26′	15″
S by W.	17	191°	15′	00″
S by W ¼ W.	17¼	194°	03′	45″
S by W ½ W.	17½	196°	52′	30″
S by W ¾ W.	17¾	199°	41′	15″
SSW	18	202°	30′	00″
SW by S ¾ S.	18¼	205°	18′	45″
SW by S ½ S.	18½	208°	07′	30″
SW by S ¼ S.	18¾	210°	56′	15″
SW by S.	19	213°	45′	00″
SW ¾ S.	19¼	216°	33′	45″
SW ½ S.	19½	219°	22′	30″
SW ¼ S.	19¾	222°	11′	15″
SW	20	225°	00′	00″
SW ¼ W.	20¼	227°	48′	45″
SW ½ W.	20½	230°	37′	30″
SW ¾ W.	20¾	233°	26′	15″
SW by W.	21	236°	15′	00″
SW by W ¼ W	21¼	239°	03′	45″
SW by W ½ W	21½	241°	52′	30″
SW by W ¾ W	21¾	244°	41′	15″
WSW	22	247°	30′	00″
W by S ¾ S.	22¼	250°	18′	45″
W by S ½ S.	22½	253°	07′	30″
W by S ¼ S.	22¾	255°	56′	15″
W by S.	23	258°	45′	00″
W ¾ S.	23¼	261°	33′	45″
W ½ S.	23½	264°	22′	30″
W ¼ S.	23¾	267°	11′	15″
WEST	24	270°	00′	00″
W ¼ N.	24¼	272°	48′	45″
W ½ N.	24½	275°	37′	30″
W ¾ N.	24¾	278°	26′	15″
W by N.	25	281°	15′	00″
W by N ¼ N.	25¼	284°	03′	45″
W by N ½ N.	25½	286°	52′	30″
W by N ¾ N.	25¾	289°	41′	15″
WNW	26	292°	30′	00″
NW by W ¾ W	26¼	295°	18′	45″
NW by W ½ W	26½	298°	07′	30″
NW by W ¼ W	26¾	300°	56′	15″
NW by W.	27	303°	45′	00″
NW ¾ W.	27¼	306°	33′	45″
NW ½ W.	27½	309°	22′	30″
NW ¼ W.	27¾	312°	11′	15″
NW	28	315°	00′	00″
NW ¼ N.	28¼	317°	48′	45″
NW ½ N.	28½	320°	37′	30″
NW ¾ N.	28¾	323°	26′	15″
NW by N.	29	326°	15′	00″
NW by N ¼ N.	29¼	329°	03′	45″
NW by N ½ N.	29½	331°	52′	30″
NW by N ¾ N.	29¾	334°	41′	15″
NNW	30	337°	30′	00″
N by W ¾ W.	30¼	340°	18′	45″
N by W ½ W.	30½	343°	07′	30″
N by W ¼ W.	30¾	345°	56′	15″
N by W.	31	348°	45′	00″
N ¾ W.	31¼	351°	33′	45″
N ½ W.	31½	354°	22′	30″
N ¼ W.	31¾	357°	11′	15″
NORTH	32	360°	00′	00″

Quartermasters, helmsmen, or wheelsmen must not be permitted to carry knives, keys, or other objects that might affect the magnetic compass and cause errors while they are on duty. Portable electric lights and telephone receivers should never be allowed near the compass. The magnetic compass should be treated with great care as it is one of the most delicate and important instruments on board ship. Men standing wheel watches should never rest their weight on the binnacle or any of its attachments.

COMPASS

The compass is an instrument used to find a desired direction and to steer by aboard ship, as well as to take bearings of terrestial and celestial objects. There are two types of compasses in general use, the magnetic compass (liquid and dry-card), and the gyro compass, which is a mechanical compass.

The various parts of a magnetic compass are: The binnacle and gimballs in which it is mounted; compass bowl; rose, or card; magnets; lubber's line; pivot; sapphire bearing; float, or air chamber; expansion chamber; false bottom with its weight; and the glass top.

A magnetic compass has the compass card divided in its outer edge into 360°, numbered from 0° to 360° and also in points and quarter points. The most common type is the spirit magnetic compass which has four bundles of magnetized steel wires in cylindrical cases sealed and secured under the compass card. These magnets are placed parallel to the north and south line of the card. The card is provided with a float, or air chamber, for the purpose of reducing the pressure on the pivot. This float has a hollow cone, open at its lower end. In this cone is the sapphire bearing, which rests upon the pivot and supports the card. The pivot is fastened to the center of the bowl by means of a flanged plate and screws. Two small holes are drilled through this plate and the bottom of the bowl, connecting the bowl with the expansion chamber and affording pas-

sage for the liquid, which is a mixture of 45% pure alcohol and 55% distilled water. The lubber's line is a fine line drawn on an enameled plate on the inside of the bowl. The card is mounted in the cast bronze bowl, and the glass cover is secured by means of screws. Rubber gaskets prevent the evaporation or leakage of the liquid, which entirely fills the bowl. The outer edge of the compass bowl is rigid and made to receive the azimuth circle. The compass is mounted in the binnacle, made of wood or a non-magnetic metal. It is suspended in its gimbal ring in the compass chamber of the binnacle and a cover, or hood, is provided for protection against bad weather and for lighting at night. Below the compass is the magnet chamber, fitted with trays to receive the compensating magnets. Side arms are fitted to carry the quadrantal correctors, which are soft iron spheres. A clinometer and a case for the Flinders bar are fitted on the binnacle. The binnacle is rigidly secured to the deck, with the lubber's line parallel to the keel.

STEERING ORDERS

Because of the possibility of confusion, the use of the words "starboard" and "port" in orders to the helmsman has been prohibited by an act of Congress. The orders to the helmsman, which must be used instead of those formerly used, are as follows:

"Right rudder," which is an order for the wheel to be turned to the right, so that the rudder and the head of the vessel go to the right.

"Left rudder," which is an order for the wheel to be turned to the left, so that the rudder and the head of the vessel go to the left.

Rudder indicators must be consistent with the above provisions.

The use of the new orders to the helmsman is mandatory on all vessels.

THE HAND LEAD LINE

On a lead line, the points representing the various fathoms are known as marks and deeps. The marks are the fathoms marked by pieces of leather or rags; the deeps are the fathoms which are not marked.

The hand lead line has 9 marks and 11 deeps and is marked as follows:

2 fathoms, two strips of leather.
3 fathoms, three strips of leather.
5 fathoms, white cotton rag.
7 fathoms, red woolen rag.
10 fathoms, leather with one round hole.
13 fathoms, same as 3 fathoms.
15 fathoms, same as 5 fathoms.
17 fathoms, same as 7 fathoms.
20 fathoms, leather with two round holes.

The marks 7 and 17 fathoms should be a red woolen or bunting rag, and the marks 5 and 15 fathoms should be a white cotton or linen rag in order that they may be distinguished at night by feeling.

The hand lead line should be marked in feet at the critical depths in the vicinity of the various light and loaded drafts of the vessel.

The line should be thoroughly wet before marking.

Permanent marks indicating 1, 2, and 3 fathoms should be marked on the deck near the pilot house for checking lead lines.

REPORTING SOUNDINGS

All soundings should be reported from the chains to the bridge in a clear, loud voice.

In reporting soundings, the number of fathoms should always be preceded by the words "By the mark" or "By the deep," depending on whether the depth found is a mark or a deep.

Fractional parts of fathoms are reported in quarters, halves, and three-quarters of fathoms from the nearest fathom. For example:

Depth found	*How reported*
5 fathoms	By the mark five.
5¼ fathoms	And a quarter five.
5½ fathoms	And a half five.
5¾ fathoms	A quarter less six.
6 fathoms	By the deep six.
6¼ fathoms	And a quarter six.
6½ fathoms	And a half six.
6¾ fathoms	A quarter less seven.
7 fathoms	By the mark seven.

The nature of the bottom may be determined by placing tallow or soap in the cup-shaped receptacle in the bottom of the lead to pick up samples, such as mud, sand, shells, etc. The nature of the bottom should be reported with the sounding if required.

THE SOUNDING MACHINE

For sounding purposes vessels are fitted with a machine consisting of a drum or spool upon which is wound a quantity of fine steel wire. This wire is made fast to the link which is attached to the lead by a fathom of log line and may be allowed to run out freely or may be reeled in by the proper use of handles attached to the machine.

About a half turn of the crank in one direction slacks the brake, while the turning of the handle in the opposite direction sets the brake and checks the wire from running out.

The depth of water may be determined by means of a depth recorder which has a gauge and indicator, or by means of glass tubes, the insides of which are either treated with a chemical preparation or roughened by grinding. The glass tube is protected by a brass case, the tube being open at the bottom and attached to the lead. As the lead descends, water is

forced into the tube according to pressure comparable with the depth attained. The water wets the chemical coating or ground interior showing how far the water entered the tube. The discolored or wet portion of the tube measured by a scale, gives the depth. In addition the machine has a clocklike dial which records the length of wire reeled out. This dial does not indicate accurately the depth of water.

METHOD OF OPERATION

After the machine is placed and handles attached, the locking arm is made fast by turning the catch around and the brake is set to prevent the wire running out. The depth recorder or the chemical tube is then adjusted and made fast to a line between the link and the sinker, and the wire made fast to the link.

The attachments are then carefully lowered overboard by hand, and the wire placed in the fair-lead with the link hanging just clear. The wire is then taut and the register on the machine should indicate zero.

When ready to make a cast, a light turn of the handle will release the brake, and the wire is kept taut by pressing upon it by the finger-pin which indicates when bottom is reached by a quick slackening of the wire under pressure of the pin.

Watch the indicator and gradually apply the brake before all the wire has passed off the drum or bottom has been reached, then reverse the motion of the drum and rewind the wire, guiding it on the drum by hand with a piece of waste canvas. Watch until the link is close to the fair-lead and then bring the depth-recorder inboard by hand, carefully keeping it upright until read.

The speed at which the ship is moving determines the length of wire in excess of depth of water required to reach bottom and great care must be exercised to avoid looping or slacking of the wire and to prevent kinks forming. A kinked wire should be discarded as a slight pull will break it.

THE FATHOMETER

The fathometer consists of a submarine oscillator located in the bottom of the ship producing a sound of such intensity as will cause it to travel to the ocean floor and be reflected back to a sensitive receiver or hydrophone, which is also located on the ship's bottom. The difference between the time of producing the sound and receiving the "echo" from the ocean depths is so translated by the fathometer indicator that it appears on the dial as a flash of red light opposite a numeral corresponding to the depth in fathoms. The fathometer is put into operation by turning the starting switch. Automatic sounding begins at once, as evidenced on the dial by flashes of light opposite the correct depths. Depth will continue to be registered on the fathometer dial as long as desired. Sudden changes in depth are immediately indicated in the same manner as are gradual changes.

THE TAFFRAIL LOG

Taffrail logs are of several types, but all act on the same principle. They consist of a registering device, a towline, and a rotator. The registering device is secured conveniently near the stern, i. e., on the taffrail. The rotator, in principle like the propeller of a ship, has its vanes so constructed and attached that the number of turns which it makes is proportionate to the speed at which it is being towed through the water. The rotator transmits its motion by a proper length of towline to the registering device. The dials of the registering device record distance run in miles and tenths of miles and not speed; therefore, to find speed the length of time between successive readings must be noted.

Logs depending on a towed rotator often give false readings due to the fact that seaweed or other obstructions slow down or stop the rotator for a time.

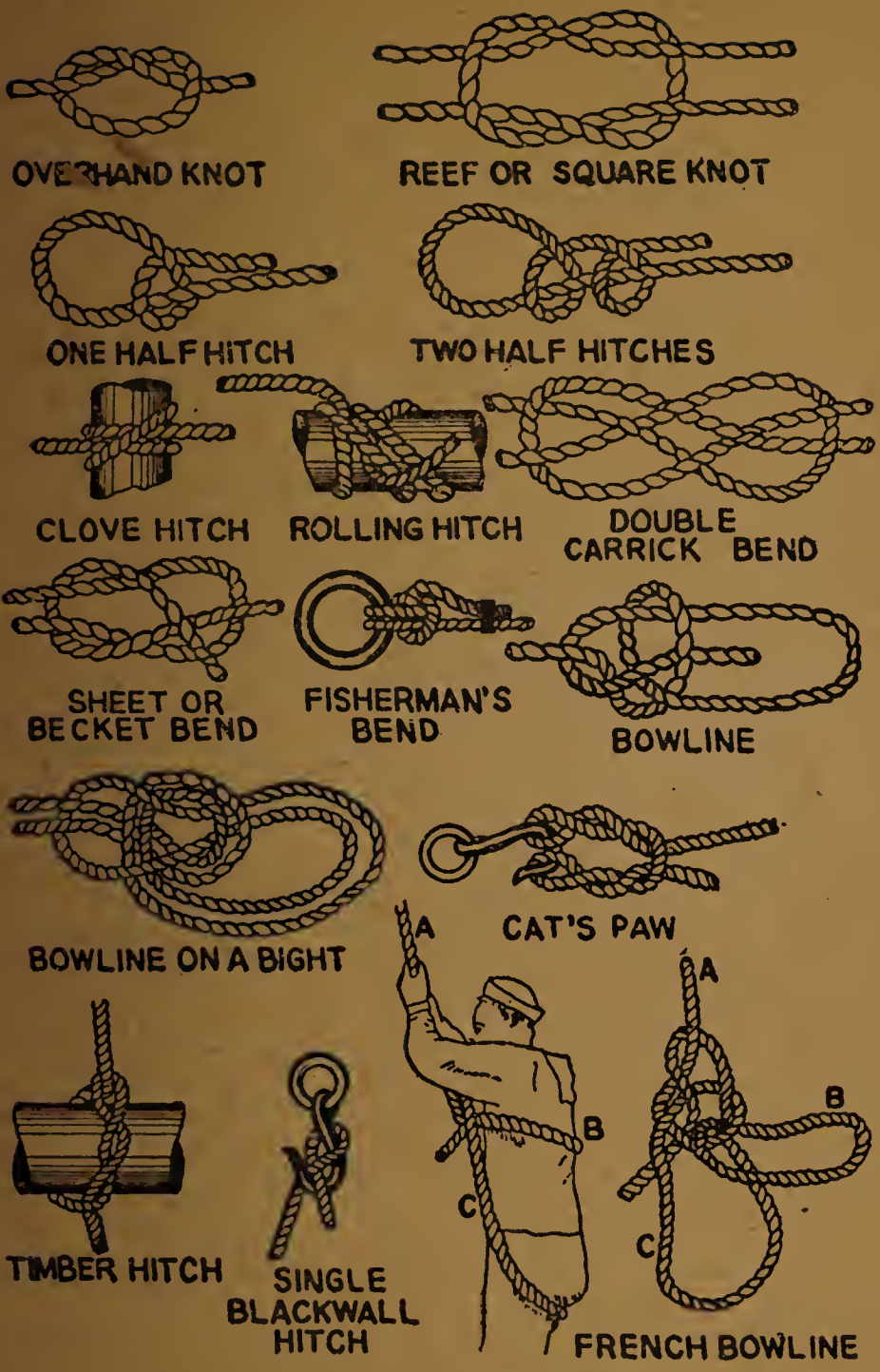
Care should be used to prevent damage to the rotator blades when streaming or hauling in the log line. The inboard or hook end of the line should be paid out over the stern to allow the turns to run

out of the line when hauling in the rotator. When the rotator is taken aboard, the line should be hauled in and neatly coiled ready for the next streaming. The log line should be thoroughly dried before stowing to prevent mildew.

KNOTS AND SPLICES

The safety of a vessel and its crew frequently depends on the knots and splices used in joining lines together. For this reason no man can consider himself a seaman until he has mastered the methods of quickly and properly tying the knots and making the splices commonly used. Any able seaman should be able to tie the following common knots: Overhand, square or reef, half hitch, clove hitch, rolling hitch, double carrick bend, sheet or becket bend, fisherman's bend, bowline, bowline on a bight, cat's paw, timber hitch, single blackwall hitch, and French bowline. (See Plate XIV.)

He should also be able to make the following splices in manila rope: Eye, short, and long. In addition, an able seaman should be able to tie other knots, including some of the various wall and crown knots, and should also be able to splice wire cables, as well as making other splices in manila, both three and four strand. He should be able to make proper mousings and seizings, and should be familiar with methods of parceling and serving. He should be thoroughly familiar with the use of the sailmaker's palm, fid, and marlinespike.



USEFUL KNOTS

PLATE XIV.—Useful knots.

SUGGESTIONS FOR SEAMEN

Men engaged in tiering chain in chain lockers should be clear of the locker before the windlass is unlocked.

Men at windlass brakes should always wear goggles when dropping anchor, to avoid eye injury due to flying particles. Goggles should be worn at all other times when any work is being done which might be injurious to the eyes.

Riding pawls or devil claws should always be kept in place on cables while a vessel is at pier to prevent injury to persons in the vicinity.

Chains should never be used with links knotted or kinked. They should never be shortened by wiring, tying, or bolting two links together.

Beckets should be used on the eyes of all mooring lines as hand grips when placing the eyes over bitts, bollards, etc. This will prevent fingers from being jammed or crushed and also permits the heaving line to be untied after a strain is on the mooring line.

A sufficient number of turns of mooring lines around the niggerheads should always be taken to hold the strain without slipping. The lines should always lead fair to the niggerhead.

When lowering or topping booms, always take the topping lift fall to the niggerhead with at least four turns.

Runners (cargo falls) should be properly secured to winch drums (preferably by wire clips, and never by rope yarns) before working cargo.

Runners should always be led from the top of the winch drum to the heel block in order to prevent fouling.

Topping lift wires should always be properly secured on cleats to prevent them from jumping off.

Davit crank handles should always be fastened with cotter pins or lock nuts to prevent them from slipping off during operation.

On blocks on boom topping lifts, cargo falls, guys, etc., use only shackles having screw pins with lock nuts and cotter pins. The jaws of other types may open, shearing the pin, and permitting the booms, cargo drafts, etc., to fall.

All wire splices should be parceled and served to prevent hand injury.

When splicing wire, the marlinespike point should always be away from the body.

Chain stoppers should always be used on wire topping lifts.

Snatch blocks should be used only when other blocks cannot be used.

All hooks should be carefully moused. When possible, shackles should be substituted.

When rigging a boatswain's chair on a stay with a shackle, never allow the shackle pin to ride on the stay—it might unscrew.

Strongback bridles should always have a lanyard of suitable length attached to each end above the hook. This will prevent many injuries to hands.

When not in place, hatch covers should be kept neatly piled, away from the hatch coamings, but abreast the section where they belong.

Strongbacks should be stowed as near the bulwark rail as possible, and on their sides.

Steel hatch covers should always be handled by the cargo fall.

Tarpaulins should never be placed over an open hatch, or over one where some of the covers or strongbacks are not in place.

Hatch covers should not be used as skids or discharging platforms. They may be damaged, with consequent injury to men.

When working a hatch section, all covers and strongbacks should be removed. If this is impossible, those remaining should be carefully secured to prevent unshipping.

Boiler compounds should never be used for washing paint work. They are too powerful for that purpose and may lead to infection, if improperly handled.

Compartments which have been closed for a long time, especially tanks or double bottoms, should not be entered until tested and found to be "gas free" and to contain oxygen. When entering such a compartment, another person should always be present.

When painting, or handling paint in a compartment, it should be well ventilated.

During a period of fumigation, no one should remain on board, except persons authorized to do so by the officer in charge of fumigation. When fumigation is completed, no one should go on board until all compartments have been thoroughly aired and ventilated. Bedding and clothing must be thoroughly aired before use after fumigation.

Bunks should not be turned upside down or reversed so that the protection of the guardrail is lost.

Bunks should never be triced up with rope yarns or other makeshift arrangements.

Pilot's and Jacob's ladders should always be kept properly secured—never to the rail—and their rungs should be intact and free from oil, grease, etc. Pilot's ladders should be used only by Pilots.

When working in a lifeboat equipped with releasing gear, while it is swung out in port, see that the releasing hooks are moused, or else use stoppers or preventers so that the boat cannot fall. All such mousings, stoppers, or preventers must be removed when the boat is secured for sea, and must not be used when at sea.

Men working over the side, or in unprotected and hazardous positions aloft, should always use safety belts or bowlines without slack in the safety lines. These lines should be made fast, independent of the staging, etc.

A safety belt should be put on before going over the side or aloft, and should not be removed until the return on deck.

Extraordinary care should be used when working on smokestacks.

Stagings should be bolted together, not nailed, and should have supports at least every 8 feet.

All staging lines should be securely attached to strong supports, never to rails or stanchions.

When working aloft, all tools should be secured by lanyards to prevent dropping.

Loose tools should never be left on gratings or other places from which they might fall.

SOME PRECAUTIONS FOR SEAMEN

Never smoke on deck, on barges, or on the pier when fuel oil is being loaded or discharged.

Never smoke in the vicinity of open hatches or in cargo holds.

While cargo lighters are alongside, do not throw lighted matches, cigarettes, etc., over the side or out of portholes.

Never go up and down ladders with both hands full.

Never work in the hot sun without protecting the head.

Never walk on the side where cargo is being worked.

Never walk under heel blocks of winches.

Never walk through unlighted 'tween deck spaces.

Never walk on weather side of decks in heavy sea.

Never walk on wet or oily decks with rubber soles or heels.

Never stand in the bight of an anchor cable or line.

Never work aloft without a safety belt and line.

Never use goggles to protect forehead instead of eyes.

Never attempt to pass through a watertight doorway while the alarm is sounding or the door is in motion.

FIRE APPARATUS

All inspected vessels are required to have on board fire axes, fire hose, and portable extinguishers.

Fire axes must be kept in places where they are readily accessible, and must not be used for other purposes.

Fire hose must be kept on reels or racks close to fire-hydrant connections and should be reeled or faked with the nozzle on top, so that it can be immediately led out ready for use. At least one hose must be kept connected to a fire hydrant ready for instant use.

The portable fire extinguishers are of four types —soda-and-acid, foam, carbon-tetrachloride and carbon-dioxide.

The soda-and-acid type is to be used on wood, paper, and fabric fires, but is not very effective on flammable liquid fires and is dangerous on fires in electrical apparatus. It must be used directly on the source of the fire. The acid in it is detrimental to fabrics, etc.

The foam type is very effective on fires in flammable liquids, but like the soda and acid type, it must be directed to the source of the fire, and is also dangerous on fires in electrical apparatus. It is harmless in its effect.

Externally the soda-and-acid type and the foam type are the same in appearance. Both are usually contained in 2½-gallon cylindrical tanks with a short length of hose connected at the top. To operate, the extinguisher is simply turned bottom-side up, and the stream from the hose is directed at the base of the flames.

The carbon-tetrachloride type is the familiar pump type usually having a capacity of 1, 1½, or 2 quarts. It is most effective on fires in electrical equipment (it is safe to use at 5,000 volts) and on fires in confined spaces in flammable liquids. It must be directed on the flames, as it depends for its effectiveness on the gas liberated by vaporizing the liquid by heat. The gas so liberated is harmful to humans and is strangulating. To operate, the handle of the extinguisher is turned to unlock it, then pulled out and used as a pump. The stream is directed on the fire by pointing the extinguisher itself in the appropriate direction.

The carbon-dioxide type is effective on all types of fires in confined spaces. Like the carbon-tetrachloride type, however, the smothering gas upon which it depends for its effectiveness is quickly dissipated in the open air. It consists of a cylinder in which carbon-dioxide gas is stored under pressure, together with a handle near the top and a control valve at the top to which is attached a short length of hose with a nozzle in the form of a horn. To

operate, the extinguisher is held by the handle, the valve at the top is opened, and the gas is directed at the fire by directing the nozzle toward the fire.

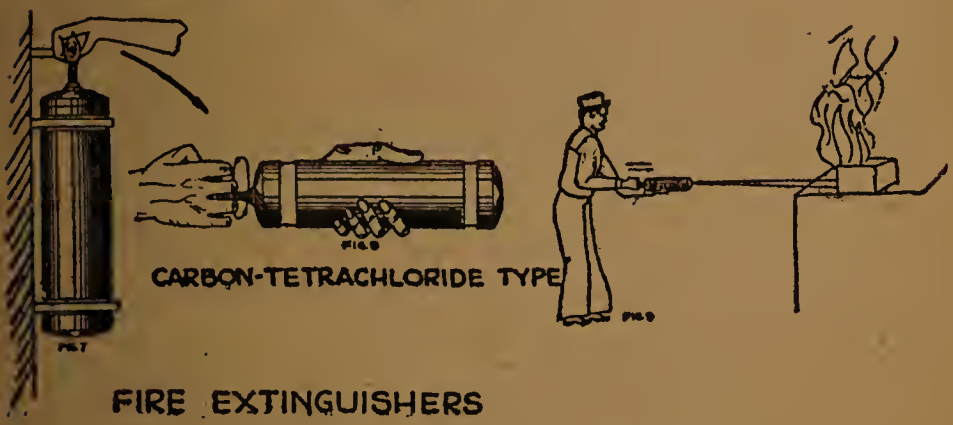


PLATE XV.—Fire extinguishers.

All fire extinguishers should be refilled immediately after using. Soda-and-acid and foam-type extinguishers must be refilled at least once a year. Carbon-dioxide extinguishers must be weighed to see whether they are full or not. Carbon-tetrachloride-type extinguishers should be tested by pumping a few drops of the contents out to make sure the extinguishers are in working condition. (See Plate XV.)

GAS MASKS, ETC.

Every passenger vessel having sleeping quarters must be provided with flame safety lamps and either oxygen-breathing apparatus with extra cylinders, or gas masks with extra canisters, the number being specified on the certificate of inspection. If two are carried, one must be in the pilot house and one in the engine room; if four are carried, two must be in the pilot house, one in the engine room, and one in the wireless room, or, if the vessel is not equipped with wireless, two in the engine room; if six are carried, three must be in the pilot house, two in the engine room, and one in the wireless room.

In addition to the above, all vessels equipped with refrigeration, except river vessels, must carry one gas mask giving protection against the refrigerant used, in addition to the breathing apparatus. Certain men, who will be designated by the master, must be drilled in the use of oxygen-breathing apparatus or gas masks on every vessel carrying such equipment.

A gas mask consists of a facepiece with glass eyepieces which is held in place by head bands, and is connected by corrugated tubing to a canister held against the chest and supported by a harness about the neck and body.

In use, the head bands are so adjusted that the facepiece is held very tightly against the face so as to prevent the entrance of gases under the mask. The facepiece should be tested for tightness by holding the palm of the hand over the bottom of the canister and inhaling strongly. The facepiece should collapse against the face and remain there as long as the breath is held and the hand remains in place.

Air or gases enter the canister through a check valve in its bottom, pass through the purifying chemicals contained in it, and then leave the top of the canister, being inhaled through the corrugated tube. The inhaled dry air enters the facepiece through tubes and is discharged over the eyeglasses to prevent fogging.

Canisters should be kept absolutely dry, as moisture causes deterioration of the contents.

The date on which the seal of a canister is broken and the canister attached to the mask should be recorded on the label of the canister. No canister should be continued in service for more than 1 year from such date, regardless of the amount of use it has had.

Gas masks simply purify the air breathed through them, but do not supply oxygen and therefore, should not be used in an atmosphere containing less than 16 per cent of oxygen. When any doubt exists as to the oxygen content of the atmosphere, it should be tested by the use of a flame safety lamp, which, because of its construction, will not ignite flammable gases and which will not burn in an atmosphere containing less than 16 per cent of oxygen. Compartments in which a flame safety lamp is extinquished should not be entered when using a gas mask.

Oxygen-breathing apparatus delivers oxygen to the wearer and is especially suited for use in air dangerously low in oxygen content, or in a dangerous concentration of poisonous or asphyxiating gases where gas masks cannot be used.

The apparatus consists of a mouthpiece or facepiece with tubes, having inhalation and exhalation valves, leading to a breathing bag containing air, a reducing valve, an oxygen cylinder, and a canister of chemicals for purifying the air exhaled.

The mouthpiece is secured in place tightly by head bands. The remainder of the apparatus is held in place either on the chest or the back by a harness.

In operation, the main oxygen valve on the cylinder is opened, oxygen passes from the cylinder through the reducing valve and into the breathing bag at a pressure of about 3 pounds per square inch. Air exhaled goes through the exhalation valve to the purifier, and thence into the breathing bag where it is mixed with oxygen. Thence it is drawn through the mouthpiece by inhalation.

Cylinders containing excess moisture should not be used. To ascertain whether excess moisture is

present, disconnect the cylinder and then open its main valve. If water is blown from the bottle, it should not be used until cleaned.

When assembled, all valves, fittings, etc., should be carefully examined for leaks, which should be immediately stopped.

The nose clip should be so tight that breathing through the nose is impossible. The mouthpiece should also be tested for tightness.

Goggles should be worn with oxygen breathing apparatus if it is used in a gas or smoke which affects the eyes.

The instruction for use of oxygen breathing apparatus and gas masks will be found inside the cover of the carrying case and should be carefully followed in the interest of safety.

PART IV

RESUSCITATION OF APPARENTLY DROWNED, SHOCKED, OR ASPHYXIATED PERSONNEL

When a person has been rendered unconscious by fumigation gas, by electric shock, drowning, or any other cause, and breathing ceases, artificial respiration should be begun at once. Proceed as follows:

1. Lay the patient on his belly, one arm extended directly overhead, the other arm bent at elbow, and with the face turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing.

2. Kneel straddling the patient's thighs with your knees placed at such a distance below his hip bones as will allow you to reach his waist easily. Place the palms of your hands on the small of his back with fingers resting on his ribs, the little finger just touching the lowest rib, with the thumb and fingers in a natural position, and the tips of the fingers just out of sight.

3. With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the patient. Your shoulder should be directly over the heel of your hand at the end of the forward swing. Do not bend your elbows. This operation should take about 2 seconds.

4. Now immediately swing backward, so as to remove the pressure completely.

5. After 2 seconds, swing forward again. Thus repeat deliberately 12 to 15 times a minute the double movement of compression and release, and complete respiration in 4 or 5 seconds.

6. Continue artificial respiration without interruption until natural breathing is restored, 4 hours or longer if necessary, or until a physician declares the patient is dead.

7. As soon as this artificial respiration has been started, and while it is being continued, an assistant should loosen any tight clothing about the patient's neck, chest, or waist. Keep the patient warm. Do not give any liquids whatever by mouth until the patient is fully conscious.

8. To avoid strain on the heart when the patient revives, he should be kept lying down and not allowed to stand or sit up. If the doctor has not arrived by the time the patient has revived, the patient should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea, etc. The patient should be kept warm.

9. Resuscitation should be carried on at the nearest possible point to the place where the patient received his injuries. He should not be moved from this point until he is breathing normally of his own volition, and then moved only in a lying position. Should it be necessary, due to extreme weather conditions, etc., to move the patient before he is breathing normally, resuscitation should be carried on during the time that he is being moved.

10. A brief return of natural respiration is not a certain indication for stopping the resuscitation. Not infrequently the patient, after a temporary recovery of respiration. stops breathing again. The patient must be watched and, if natural breathing stops, artificial respiration should be resumed at once.

11. In carrying out resuscitation, it may be necessary to change the operator. This change must be made without losing the rhythm of respiration. By this procedure, no confusion results at the time of change of operator, and a regular rymthm is kept up. The treatment must not be given up until at least 4 hours of steady, unremitting resuscitation has been tried, unless, of course, the patient commences to breathe of his own volition.

PART V

STANDARD STATION BILLS AND EMERGENCY DRILLS

Before sailing, station bills and muster lists must be posted in the crew's quarters and in conspicuous places on every passenger vessel and also on every other vessel of more than 500 gross tons which is subject to inspection. The station bill must contain full particulars of the signals which will be used for calling all members of the crew to their stations for emergency duties.

The duties provided for by the station bill include the following:

1. Closing the airports, watertight doors, fire doors and fire screens, covers and all valves of all scuppers, sanitary, and other discharges through the hull below the margin line, and stopping the fans and ventilating system.
2. The extinction of fire.
3. The equipment of boats, rafts, and buoyant apparatus, and their preparation for launching.
4. The muster of passengers, which includes warning the passengers, seeing that they are dressed and have on properly adjusted life preservers, assembling them and directing them to appointed stations, keeping order, and generally controlling their movements.

Special duties shall be allotted to each member of the crew, and the muster lists shall show all these special duties and indicate the station to which each man must go, and the duties he has to perform. The special duties should, as far as possible, be comparable to the regular work of the individual.

The station bill should be prepared in conformity with specimen Standard Form Station Bills, a copy of which may be obtained from the Officer In Charge, Marine Inspection. The emergency signals and instructions have been incorporated in this form.

The continuous ringing of the general alarm bells has but one meaning—fire and emergency. The crew, trained to recognize this signal, shall proceed to their emergency stations immediately and carry out their allotted duties quickly and effectively. In the event of an actual collision, or stranding, those men assigned to fire hose, hydrants, axes, extinguishers, etc., must assist in closing all airports, side scuttles, side ports, watertight doors, and ventilator ducts in the vicinity of their stations.

The General Rules and Regulations provide that the master of any vessel may establish such additional emergency signals as will provide that all the officers, crew, and passengers of the vessel will have positive and certain notice of the existing emergency.

The ten standard instructions provide for emergencies which may occur on board the various types of vessels. Where one or more of these instructions does not apply to a particular type of vessel, they need not be considered. The crew, however, will be familiar with all standard instructions in the event they are transferred to a vessel to which they are applicable.

The advantages of this form are numerous. For instance, when a member of the crew wishes to find his emergency stations, he may look under the respective department in the left-hand column and follow down until he arrives at his rating and number and then read to the right in each column for his station and duties at each emergency drill. With this form in use throughout the merchant service, the personnel become thoroughly familiar with it and need not study and interpret a different form each time they change ships. In this manner, the emergency drills become highly efficient and well organized, as crews become familiar with all standard emergency drill signals and procedures prior to reporting aboard and need only to ascertain the specific post and duties of their assignments.

The object of the standard station bill is to provide a uniform system for training the members of crews of all vessels in the duties that they would

be required to undertake in the event of any accident to the vessel which may, if not skillfully handled, involve the abandonment of the vessel. Such uniform training builds up an efficient organization so that in an actual emergency such as fire, stranding, or collision, the appropriate members of the crew will immediately proceed to their allotted stations and carry out the duties assigned to them with a view to dealing with the emergency. Should the abandonment of the vessel become necessary, they will promptly prepare the boats and other lifesaving equipment for use, warn the passengers, and control their movements in the interest of safety.

The preparation of station bills is facilitated by indicating the berth or article number (instead of names) of the individual members of the crew, with the emergency duties assigned to them. A number and card should be fixed to each berth or issued to each member of the crew at the time of signing articles. This supplementary station bill card shows the emergency duties in detail, and location of the station. All signals connected with these duties should be included. In order to provide for a permanent assignment to lifeboats, the station bills should be made up on the basis of maximum passenger and crew capacity.

Station bills must be framed and posted under glass to command the attention of the entire personnel and serve as a guide and constant reminder of what is required and expected of them. On board vessels employing large crews, it is recommended that the station bill be made up in sections and posted in the mess room, quarters, or passageway adjacent to the quarters of each department.

The use to which the lifeboats, life rafts, or buoyant appliances which are provided against the contingency of the vessel having to be abandoned, will be put during an emergency depends on the efficiency of the crew. It is not enough that individual members of the crew should be experts in the management of a boat. Well-organized teamwork is necessary and the organization must cover not only the lowering and handling of the boats or

rafts, but also the effective manning of all emergency stations. No amount of material improvement in equipment and arrangement can take the place of a well-instructed, disciplined, and properly organized crew. The establishment of uniformity is essential.

The duties connected with the assisting and controlling of the passengers should normally be assigned to certain members of the steward's department. In emergencies they shall warn all passengers, assist them to obtain and put on life preservers and direct them to the assembly or embarkation stations. They are to keep order in the stairways, passages and doorways, and impress upon passengers the serious danger of injury from leaping overboard. In this connection, the importance of using the side ladders for the purposes of entering the boats should it prove necessary to embark after the boats have been lowered into the water, should be pointed out. At drills they should explain to the passengers the process of abandoning ship and emphasize that the general alarm signal is not in itself a signal to abandon ship, but is intended to secure the orderly assembly of passengers at the appointed stations. The steward's department crew should encourage the attendance of all passengers during emergency drills and should be prepared to instruct and assist the passengers. Passengers and crew must be cautioned against attempting to pass through doorways while watertight doors are in motion or the closing signal is sounding.

On all vessels, the allocation of members of the crew to the duties of closing airports and distributing life preservers to the passengers in various parts of the vessel, and preparing and launching the life rafts and buoyant apparatus, should receive special attention.

Cards posted in staterooms for the instruction of passengers must clearly state the various emergency signals and the location of the allotted assembly station of the occupants, or the number of the lifeboats to which they are assigned.

In assigning the crew to stations and duties comparable to their regular work, consideration should be given to the quarters and working station of personnel.

The importance of organizing and training an emergency squad cannot be overemphasized. This squad must be carefully selected from the crew for their experience, intelligence, and endurance. On the signal, the squad assembles near the bridge with fire axes, crowbar, fire extinguishers, extra lengths of hose, gas masks, life lines, first-aid kit, safety-lamp, flashlight, etc., and then proceeds to the scene of action under proper direction and takes over the real work of clearing away wreckage, fighting fires, etc. In the event of a man overboard, the emergency squad shall assist the emergency boat crew clear away and swing out the lee boat and tend the boat falls or winch; assist the boat crew into life preservers and, if necessary, fill in the vacant thwarts to man the boat in the shortest possible time. This squad and all officers should be instructed in the operation of the emergency steering gear, auxiliary lighting system, oxygen-breathing apparatus, steam-smothering and CO_2 control valves and cut-off valves to fuel-oil system. On vessels where the size of the crew permits, the carpenter, plumber, machinist, and electrician should be included in this squad.

Men must be assigned to closing all ports and overboard discharge valves (except those in the engine room) below the bulkhead or main deck under proper direction. Watertight doors shall in all cases be closed immediately upon sounding of the emergency signal. After a collision, the machinery for closing these doors may be damaged.

Men from each lifeboat should be assigned to the embarkation deck to assist passengers entering the boat and capable men must be assigned to lead out and tend painters. Painters should be made fast at the ship's rail in such manner that they may be readily released from that position even if under severe strain. The sea painter should be made fast at a point in its length with due regard to the vessel's draft on each particular voyage so that when

the boat is in the water and the sea painter is taking the strain, the boat fetches up abreast a lifesaving net.

The practice of assigning a small group of men in charge of a deck officer to prepare all lifeboats and swing them out ready for lowering on the emergency signal is to be encouraged. In the event the emergency gets beyond control, the boats will then be ready for abandoning ship and the crew assigned to abandon ship stations accordingly.

Only competent men should be entrusted with the command or as second in command of lifeboats. A comprehensive knowledge of the boat problem is necessary so that under various circumstances a lifeboat may be launched successfully. Hesitation and insufficient leadership are direct incentives to accident. This consideration demonstrates that the boat commander and the man attending the releasing gear have responsible tasks and that skilled cooperation is absolutely necessary. The lifeboat commander has charge of the entire operation and should be in the boat during the operation of lowering because he must decide the opportune moment for releasing the boat falls.

The practice of conducting a combined fire and boat drill has apparently been adopted by ship masters because of its convenience. Emergency drills conducted on specific days at the same hour do not demonstrate crew efficiency. This practice finds the crew waiting for the fire signal with their life belts already on and the engineers warned well in advance of the imminent use of the fire pumps. Boat drills should be separated from fire drills occasionally to insure prompt response to the boat station signals. That portion of the crew who are on watch during these prearranged drills seldom are mustered at their emergency stations during the entire voyage.

The fire pumps shall be started immediately upon sounding of the fire and emergency signal and must be properly attended. The relief valves will dispose of excess pressure.

Although the size of the crew is limited on freight and tank vessels, each member of the crew must be

assigned to definite duties in emergencies, such as closing shaft alley doors, attending the steam-smothering system, putting the plug in No. 2 boat or forward fall of No. 1 boat, attending painter, etc.

Many cargo vessels and tank ships are certificated to carry persons in addition to crew under the Merchant Marine Act of 1920, therefore, the steward's department should assist these passengers with life preservers and direct them to the allotted lifeboats.

Cargo vessels equipped with watertight doors should have men assigned to close the doors. The crew, divided as equally as possible and assigned to all lifeboats, must be mustered and instructed during these drills. While it is true that these vessels carry sufficient lifeboats on each side for all persons on board, conditions may exist on the vessel whereby the crew cannot reach their respective boats. Therefore, all boats should be manned and as many as possible launched in case of emergency.

Attention is directed to Department of Commerce notices entitled Station Bills, Drills and Reports of Masters (Form 809A and B) which are posted about the ship for additional information regarding emergency drills.

EMERGENCY SQUAD

The masters of ocean, coastwise, Great Lakes, bay, sound and river passenger, cargo, and tank ships should organize and train a squad of men for the special duty of handling any emergency that might occur on board ship. This so-called emergency squad, consisting of from 6 to 24 men depending on the size of the crew, should be selected for their skill in their special calling, such as able seamen, quartermasters, boatswains, carpenters, electricians, and deck engineers, or oilers. They should be placed under the charge of the chief officer and trained to respond promptly to such emergencies as fire aboard ship, man overboard, steering gear casualties, and collision and to handle emergencies effectively.

The master of the ship should designate a signal for calling the emergency squad. On ships that are

fitted with a loudspeaker system, the squad may be called by means of loudspeakers placed advantageously in the crew quarters. In case a fire alarm is turned in over the manual alarm-call-box system, fire-alarm bells ring in the pilot house, engine room, and crew quarters. Immediately upon the sounding of the manual fire-alarm bell, the fire pumps must be started so that by the time the emergency squad arrives at the scene of the alarm, water under pressure will be available for fighting fire. In addition to the manual-alarm system, the fire alarm may be given by the melting of a sprinkler head or the sounding of an automatic fire-detection system. The alarm of fire in a cargo space may be indicated in the pilot house by either the audible alarm or the detection of smoke through the smoke-detection system.

If the location of the alarm is known, the emergency squad may be dispatched by means of the loudspeaker or other signals directly to the scene, without the necessity of their reporting to the pilot house. The first of the squad to arrive on the scene leads out adjacent hoses and starts to extinguish the fire. Sometimes the fire may readily be put out by the use of fire extinguishers, which the squad gathers on its way to the fire. A well-trained squad should arrive at the designated location on the largest ship within a minute or two. The chief officer, or officer who first arrives on the scene, immediately estimates the situation and directs a messenger from the squad to inform the officer of the deck watch, either by means of talk-back loudspeakers, telephone, voice tubes, or by proceeding to the bridge, of the location of the fire, probable seriousness of the situation, and whether or not it is necessary to change course or stop the vessel to make a lee. Upon receipt of word on the bridge, it may readily be determined if it is necessary to sound the general fire-alarm signal.

The members of the emergency squad take such immediate steps as the occasion requires to fight the fire with water, close adjacent fire-screen doors and air ports to stop the draft, close ventilator dampers, arrange for the stopping of the ventilation system

in that part of the ship, and warn the passengers in adjacent accommodations.

If the general fire alarm has sounded, the squad directs all members of the crew assigned to adjacent hoses to lead in all hoses possible to bear, without delay, in order to apply as large a volume of water as possible on the fire. Hoses may be coupled together, some may be passed from deck to deck, and streams from as many hoses as reach may be played on the fire. The officer in charge shall keep the master informed of the progress attained, and if he believes it necessary he may advise stopping the ship and clearing away the boats, if quick control of the fire is not possible.

The emergency squad shall provide fire axes, crowbars, fire extinguishers, spare length of fire hose, nozzle and spanners, flashlights, gas masks, oxygen-breathing apparatus and a safety flame lamp.

All members of the squad must be thoroughly trained in the use of gas masks for rescue purposes and instructed in the limitations of possible use of the all-service gas mask and safety flame lamp. The oxygen-breathing apparatus should be reserved for service when it is necessary to furnish oxygen to the would-be rescuer, in cases of oxygen depletion within a compartment. The gas masks or oxygen-breathing apparatus should be kept in the containers until actually necessary to use them. This is to prevent damage to the equipment. Instructions for the use of this equipment are printed inside the cover of the container, and should be carefully observed. Men entering smoke-filled compartments should wear a safety belt fitted with a line so as to enable them to be dragged to safety.

The emergency squad shall respond to all man-overboard calls and prepare to swing out the emergency boat on the designated or lee side, assist the emergency boat crew into life preservers, tend the falls or mechanical lowering gear and frapping lines, and if necessary men from the squad shall fill in vacant thwarts to expedite launching of the boat. If necessary to use storm oil, a man from the squad

is detailed for the purpose and at least one man keeps watch on the person overboard until relieved by regular lookouts. At night time the searchlights are manned. The squad should hang an ordinary rope net cargo sling over the side, aft of the emergency boat, for picking up the boat crew in case the boat is overturned when launching. This sling may be used to pick up tired or exhausted persons, in view of the fact that a person may easily entangle his arms and legs in the net and be hoisted aboard in safety. As soon as one boat is cleared away and lowered, the remainder of the squad should prepare the other boat for lowering, and then provide heaving lines to pass the sea painter to the boats and arrange for hoisting the boat or boats upon their return. A pilot's ladder should also be hung over the side to take the crew aboard.

In case of collision, the squad shall report to the scene and immediately start closing hand-operated watertight doors adjacent to the damage, close airports, and ventilation ducts passing through the boundary watertight bulkheads, and make every effort to localize the damage. The chief officer should instruct his messenger to report the extent of the damage to the master or officer of the deck watch, with such recommendations as are necessary. All overboard discharges in the vicinity shall be closed and preparations made to effect temporary repairs, if feasible. Soundings shall be taken of adjacent compartments to determine if leakage has occurred. The squad provides topping mauls, crowbars, and wrenches to assist in closing watertight doors that may be sprung and need some forcing to close effectually. Flashlights should be provided at nighttime and cargo lights rigged at the scene as soon as possible to provide illumination.

The emergency squad should be thoroughly trained in the methods of changing over from the regular steering gear to all auxiliary steering gears and instructed in the manning and steering of the ship by all possible steering gears. This instruction should be given by the officers with special instructions regarding the handling of mechanical parts

given by the chief engineer. All deck and engine officers should be thoroughly instructed in changing steering gears. All clutches, pins, and couplings should be marked, numbered, or lettered, and a sign should be posted at each station, showing all instructions for changing from one method of steering to another. Members of the squad should take their stations at each steering wheel and man voice tubes and telephones promptly so that the vessel may be steered from any steering station without delay. All members of the squad should be instructed to center the steering wheels and gears amidship before shifting gears or clutches.

A well-trained emergency squad will prove itself invaluable aboard ship and in many cases emergencies may be met successfully by the squad without calling the entire crew to emergency stations. However, the alert officer of the watch or ship master should never hesitate to sound the general alarm without delay if the emergency warrants such action.

☆ 595071—440

CONTENTS

Introduction 1
Part I..... 3
Certificates of service and efficiency..... 3
Requirements and examination for certificate of efficiency as lifeboatman..... 3
Requirements and examination for certificate of service as able seaman..... 7
Part II..... 13
Lifeboatmen 13
Lifeboats 13
Lifeboat davits 20
Disengaging apparatus 25
Lifeboat equipment 26
Life rafts, life floats, and buoyant apparatus 38
Life raft, life float, and buoyant apparatus equipment 40
Questions and answers for lifeboatmen..... 61
Part III 73
Able seamen 73
Handling a boat under oars..... 74
Mariner's compass..... 77
Compass 80
Steering orders 81
Hand lead line..... 82
Reporting soundings..... 82
Sounding machine 83
Method of operation..... 84
Fathometer 85
Taffrail log 85
Knots and splices..... 86
Suggestions for seamen..... 88
Some precautions for seamen..... 91
Fire apparatus 91
Gas masks, etc..... 94
Part IV 97
Resuscitation of apparently drowned, shocked, or asphyxiated personnel..... 97
Part V 99
Standard station bills and emergency drills. 99
Emergency squad 105

PART I

CERTIFICATES OF SERVICE AND EFFICIENCY

Certificates of efficiency as lifeboatman and certificates of service as able seaman will be issued by the Officer in Charge, Marine Inspection, or Officer designated as Acting Officer in Charge, to any applicant if found to be qualified after suitable examination based upon the qualifications of the applicant. No lifeboatman will be considered a certificated lifeboatman unless he possesses one of the certificates of efficiency as lifeboatman and no seaman will be considered an able seaman unless he possesses a valid certificate of service as able seaman.

REQUIREMENTS AND EXAMINATION FOR CERTIFICATE OF EFFICIENCY AS LIFEBOATMAN

PEACETIME REGULATIONS; LIFEBOATMAN:

An applicant, to be eligible to sit for a certificate of efficiency as lifeboatman, must furnish satisfactory evidence to the examiner that he has had the following experience:

First—Not less than 12 months' sea service in the deck department or not less than 24 months' sea service in the other departments on board vessels in ocean, lake, bay, or sound service; or

Second—A graduate of a school ship approved by and conducted under rules prescribed by the Secretary of Commerce or the Commandant of the Coast Guard; or

Third—A graduate of the United States Naval Academy or the United States Coast Guard Academy; or

Fourth—A graduate of a school ship operated by the United States Maritime Service.

WARTIME REGULATIONS: LIFEBOATMAN:

Lifeboatman. (a) An applicant, to be eligible to sit for a certificate of efficiency as lifeboatman, must furnish satisfactory evidence to the examiner that he has had the following experience:

(1) Not less than six months' sea service in the deck department or not less than twelve months' sea service in the other departments on board vessels in ocean, lake, bay, or sound services; or

(2) A graduate of a school ship approved by and conducted under rules prescribed by the Commandant, United States Coast Guard; or

(3) Two years' training at the United States Naval Academy or the United States Coast Guard Academy; or

(4) A graduate of a school ship operated by the United States Maritime Service; or

(5) A cadet of the United States Merchant Marine Cadet Corps, who produces evidence of satisfactory completion of basic training.

Before a lifeboatman's certificate may be granted, the applicant must prove to the satisfaction of the examiner that he has been trained in all the operations connected with launching lifeboats and life rafts and the use of oars and sail; that he is acquainted with the practical handling of the boats themselves; and, further, that he is capable of understanding and answering the orders relative to lifeboat service.

The oral examination shall consist of questions regarding the construction of lifeboats and life rafts, the names of their different parts, and a description of the equipment required; the construction and functions of the gravity, radial, and round-bar types of davits; clearing away, swinging out, and lowering boats and rafts; handling boats under oars and sails; and nautical terms used in connection with launching and handling lifeboats.

The practical examination shall consist of a demonstration of the applicant's ability to carry out the orders incident to launching lifeboats, and the use of the boat's sail, and rowing.

The certificate, headquarters record, and stub shall bear an imprint of the left thumb of the holder on the back thereof.

Every person employed in a rating as lifeboatman on any vessel coming under the provisions of these rules and regulations shall produce a certificate as lifeboatman to the United States shipping commissioner, United States collector or deputy collector of customs, or master before signing articles of agreement. No certificate of efficiency as lifeboatman is required of any person employed on any unrigged vessel, except seagoing barges.

REQUIREMENTS AND EXAMINATION FOR CERTIFICATE OF SERVICE AS ABLE SEAMAN

PEACETIME REGULATIONS: ABLE SEAMEN.—An applicant for a certificate of service as able seaman shall be at least 19 years of age and meet the following service requirements:

(a) *High Seas and Inland Waters.*—(1)—*"Any waters"—Unlimited (green).*—Three years' service on deck at sea or on the Great Lakes on vessels of 100 gross tons or over to which sec. 1 (a) of the Act of June 25, 1936, amending sec. 13 of the Act of March 4, 1915, applies, including decked fishing vessels and vessels in the United States Government service.

(2) *"Any waters"—Unlimited (green).*—Graduates of school ships approved by and conducted under the rules of the Secretary of Commerce; graduates of school ships operated by the United States Maritime Service; graduates of the United States Naval Academy; and graduates of the United States Coast Guard Academy, upon graduation in good standing.

(3) *"Any Waters 12 months"—Limited (blue).*—Twelve months on deck of such vessels at sea or on the Great Lakes. (Holders of certificates under this provision are limited to one-fourth of the number of able seamen required by law to be employed on a vessel.

(b) *Great Lakes and Inland Waters. "Great Lakes—18 months' service" (blue).*—Eighteen months' service on deck at sea or on the Great Lakes, smaller lakes, bays or sounds on vessels of 100 gross tons or over to which sec 1 (a) of the Act of June 25, 1936, amending sec. 13 of the act of March 4, 1915, applies, including decked fishing vessels and vessels in United States Government service. (Holders of cirtificates under this provision may comprise the required number of able seamen on vessels on the Great Lakes and on the smaller lakes, bays, and sounds.) If the seaman possesses the requisite service for a certificate under paragraph (a) (3), there shall be added "high seas—12 months."

(c) *Tugs and towboats.—"Tugs and towboats only on the high seas."—Limited (blue).*—Eighteen months' service on deck at sea or on the Great Lakes or on the bays and sounds directly connected with the seas.

(1) *Bays and Sounds.—"Bays and sounds.—12 months, vessels 500 gross tons or under not carrying passengers"—Limited (blue).* Twelve months' service on deck at sea or on the Great Lakes or on the bays and sounds connected directly with the seas.

(2) *Seagoing barges.—"Seagoing barges—12 months"—Limited (blue).*—Twelve months' service on deck at sea or on the Great Lakes or on the bays and sounds connected directly with the seas.

(d) *General.*— (1) *Physical condition.*— Applicants for Able Seamen certificates shall meet the following general requirements. However, where an applicant is not possessed of the vision, hearing and general physical condition to the degree required herein, the Merchant Marine Inspector in Charge, after consultation with the Public Health Service physician may make recommendations to Headquarters for an exception to these requirements if, in their opinion, extenuating circumstances warrant special consideration. In this connection recommendations from agencies of the Federal Government operating Government vessels as well as owners and operators of private vessels, made in behalf of their employees, shall be given full consideration as a de-

termining factor in arriving at a decision. Requests for decisions must be accompanied by all pertinent correspondence, records and reports so that Headquarters may be fully informed in all respects.

No certificate of service as Able Seaman shall be issued except upon the official certificate of a surgeon of the United States Public Health Service respecting the eyesight, hearing, and physical condition of the applicant. Persons serving or intending to serve in the Merchant Service are recommended to take the earliest opportunity of ascertaining, through examination by an aphthalmic surgeon, whether their form vision, and color vision where required, is such as to qualify them for service in that profession throughout their sea career; the Public Health Service will give voluntary examinations to such persons requesting same, the color vision test will be by means of the "Stillings" test, or failing that, the "Williams" lantern test. A person failing the "Stillings" test and wishing to qualify by the lantern test shall, if the Public Health Station at which he is undergoing test is not equipped with a lantern, pay his own expenses to journey to such station as is equipped with same.

LIST OF U.S.P.H.S. STATIONS EQUIPPED WITH WILLIAMS LANTERNS

MARINE HOSPITALS

Baltimore, Md.
Boston, Mass.
Buffalo, N. Y.
Chicago, Ill.
Cleveland, Ohio.
Detroit, Mich.
Ellis Island, N. Y.
Evansville, Ind.
Galveston, Tex.
Key West, Fla.
Louisville, Ky.
Memphis, Tenn.
Mobile, Ala.
New Orleans, La.
New York, N. Y.
Norfolk, Va.
Pittsburgh, Pa.
Portland, Maine.
St. Louis, Mo.
San Francisco, Calif.
Savannah, Ga.
Seattle, Wash.
Staten Island, N. Y.
Vineyard Haven, Mass.

RELIEF STATIONS

Los Angeles, Calif.
Miami, Fla.
Portland, Ore.
Port Huron, Mich.
Providence, R. I.
Philadelphia, Pa.
Washington, D. C.

Candidates for Able Seaman certificates must have, either with or without glasses, at least 20/20 vision in one eye and at least 20/40 in the other. Candidates who wear glasses, however, must also be able to pass a test without glasses of at least 20/40 in one eye and at least 20/70 in the other. Color sense will be tested by means of the "Stillings" test, but applicants who fail this test will be eligible if they can pass the "Williams" lantern test. Epilepsy, insanity, senility, acute venereal disease or neurosyphilis, badly impaired hearing, or other defect that would render the applicant incompetent to perform the ordinary duties of a seaman at sea are causes for certification as incompetent.

Should the service of a U. S. Public Health physician not be available, the examinations for certificated personnel may be conducted by a full time Federal physician or in exceptional cases may be made by full time regularly employed physicians of steamship companies.

In cases where an applicant for a certificate as Able Seaman is in possession of an unexpired license, the physical examination may be waived. If he holds a certificate as able seaman (old form) issued prior to December 25, 1936, he may be issued a new certificate upon surrender of his old certificate without any examination, *except as to his eyesight and color sense*, unless he is obviously physically incapable of performing the duties of an able seaman, in which case he will be required to pass a physical examination before a physician of the U. S. Public Health Service or a reputable physician acceptable to the Officer in Charge, Marine Inspection. If a seaman holding a certificate as able seaman (old form) also holds a certificate as lifeboatman (old form) issued

UNITED STATES COAST GUARD

MANUAL FOR LIFEBOATMEN AND ABLE SEAMEN

AUGUST 1944

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1944

MANUAL FOR LIFEBOATMEN AND ABLE SEAMEN

INTRODUCTION

The Seamen's Act of March 4, 1915, as amended by Congress June 25, 1936, provides for the issuance of certificates of efficiency to lifeboatmen and certificates of service to able seamen. This manual is written for the information of men employed in the merchant marine of the United States who wish to qualify as lifeboatmen and able seamen.

Part I of the manual states the requirements to be met prior to examination for a certificate of efficiency as lifeboatman and for a certificate of service as able seaman. It also states the nature of the examinations.

Part II concerns lifeboatmen. Lifeboats, life rafts, life floats, buoyant apparatus, davits, and releasing gear are described. Equipment required by law for lifeboats, life rafts, life floats, and buoyant apparatus on vessels in different services is listed, and general information of interest to lifeboatmen is included, as is also a series of questions and answers.

Part III concerns able seamen. It does not attempt to treat the entire subject of seamanship but does include sections covering certain branches of seamanship which are important.

Part IV consists of a description of the prone-pressure method of resuscitation of apparently drowned, shocked, or asphyxiated personnel.

Part V covers the subjects of station bills, muster lists and all emergency drills together with detailed instructions for emergency squads. This part is of interest to all seamen in every department of the ship.

prior to December 25, 1936, he may be issued a new certificate as lifeboatman under the same condition.

(2) *Training.*—Before such a certificate is issued to any applicant, he shall prove to the satisfaction of the Officer in Charge, Marine Inspection, or the officer designated as Acting Officer in Charge, both by oral examination and by actual demonstration, that he has been trained in all the operations connected with the launching of lifeboats and life rafts, and the use of oars; that he is acquainted with the practical handling of the boats themselves; and, further, that he is capable of taking command of a boat's crew. If convenient to the board and applicant, written examination may be given in lieu of oral examination.

(3) *Examination.*—The examination shall consist of questions regarding lifeboats and liferafts, the names of their essential parts, and a description of the required equipment; the clearing away, swinging out, and lowering of boats and rafts, the handling of boats under oars, including questions relative to the proper handling of a boat in running before a heavy sea, in pulling into a sea, etc.; the construction and functions of gravity, radial, and quadrantal types of davits. There shall also be included questions concerning the applicant's knowledge of nautical terms; boxing the compass, either by degrees or points according to his experience; running lights, passing signals, fog signals for vessels on high seas, in inland waters, or on the Great Lakes depending upon the waters on which the applicant has had service; distress signals; knowledge of commands in handling the wheel by obeying orders passed to him as "wheelsman," and knowledge of the use of engine-room telegraph or bell-pull signals.

(4) *Demonstration of ability.*—In the actual demonstration, the applicant shall show his ability by taking command of a boat and directing the operation of clearing away, swinging out, lowering the boat into the water, and acting as coxswain in charge of the boat under oars. He shall demonstrate

his ability to row by actually pulling an oar in the boat. He shall also demonstrate knowledge of a few of the principal knots, bends, splices, and hitches in common use by actually making them.

(5) *Certificate.*—Every person employed in a rating as able seaman on any vessel coming under the provisions of these rules and regulations shall produce a certificate as able seaman to the United States shipping commissioner, United States collector or deputy collector of customs, or master before signing articles of agreement. No certificate as able seaman is required of any person employed on any unrigged vessel except seagoing barges, nor on any tug or towboat on the bays and sounds connected directly with the seas.

(6) *Waters on which employed.*—Each certificate issued shall state the waters on which the holder is permitted to be employed as an able seaman.

(e) WARTIME REGULATIONS: ABLE SEAMEN.—

(1) Persons otherwise qualified who are eighteen years old or upward may be rated able seamen.

(2) *Able Seamen certificates, unlimited (green).*—A seaman holding this certificate is eligible to serve thereunder as Able Seaman in any vessel on any waters. A candidate who passes the prescribed professional and physical examination may be certificated as Able Seaman, Unlimited, after *nine months'* service on deck, at sea, or on the Great Lakes, in vessels (including yachts, whaling vessels, ocean-going tugs and barges, and foreign flag ocean vessels) of 100 gross tons or over, or in decked fishing vessels or United States Government vessels of any tonnage. A candidate who has completed 6 months' service on deck in any such vessel may submit evidence of additional service or training, which if considered as a fair and reasonable equivalent by the examining officer, and approved by Coast Guard Headquarters, may be accepted in lieu of the service specified in this section. Any seaman lawfully in possession of the One Year (blue) Able Seaman

Certificate, or the Eighteen Month Great Lakes Able Seaman Certificate, shall be eligible under the authority of such certificate for the same unlimited employment to which he would be eligible under the Able Seaman, Unlimited (green) certificate.

(3) *Great Lakes Able Seaman Certificate* (blue).—A seaman holding this certificate is eligible to serve thereunder as Able Seaman in any vessel on the Great Lakes or lakes, bays or sounds. A candidate who passes the prescribed professional and physical examination may be certificated as Able Seaman for Great Lakes and lakes, bays or sounds, after *six months'* service on deck, at sea, or on the Great Lakes or lakes, bays or sounds, in vessels (including yachts and whaling vessels) of 100 gross tons or over, or in decked fishing vessels or United States Government vessels of any tonnage. A holder of Great Lakes Able Seaman Certificate (blue) may, after examination, be certificated as Able Seaman, Unlimited (green), after obtaining six months' service on deck, at sea, or on the Great Lakes, in vessels (including yachts and whaling vessels) of 100 gross tons or over, or in decked fishing vessels or United States Government vessels of any tonnage, in addition to the service required to obtain the Great Lakes Able Seaman Certificate (blue). A holder of Great Lakes Able Seaman Certificate (blue) may qualify for Able Seaman Certificate Unlimited (green) as provided in paragraph 2.

(4) *Able Seaman Certificate, Miscellaneous (blue).*—A seaman holding this certificate is eligible to serve thereunder as Able Seaman in freight vessels of 500 gross tons or less on bays or sounds, and in tugs, towboats and barges on any waters. A candidate who passes the prescribed professional and physical examination may be certificated as Able Seaman, Miscellaneous (blue), after six months' service on deck, on any waters, in any vessels of any tonnage. A holder of such certificate may, after examination, be certificated as Able Seaman, Unlimited (green), after obtaining six months' service on deck, at sea, or on the Great Lakes, in vessels

(including yachts and whaling vessels) of 100 gross tons or over, or in decked fishing vessels or United States Government vessels of any tonnage, in addition to the service required to obtain the Able Seaman Certificate Miscellaneous (blue).

(5) The provisions of (a) to (c–2) in conflict with the provisions of this paragraph are superseded for the duration of the war and six months thereafter.

(6) The certificates issued under the authority of this paragraph shall be marked or stamped: "Unless sooner invalidated this certificate shall expire six months after the termination of the war." A seaman in possession of a certificate issued under the wartime regulations who can produce documentary evidence of further service since obtaining such certificate of service, sufficient to comply with the peacetime sea service requirements of (a) to (c–2), may be issued a new certificate without the notation as stated above.

PART II

LIFEBOATMEN

The following pages contain information which will prove helpful to a member of a lifeboat crew in familiarizing himself with various terms used in connection with such boats, and in preparing himself for examination for a certificate of efficiency as lifeboatman. There are also included plates showing the different parts of a lifeboat with their names, three plates showing the different types of davits, and lists of the equipment required on various classes of lifeboats, life rafts, life floats, and buoyant apparatus.

LIFEBOATS

The modern lifeboat is a so-called "double ender" of the whaleboat type. In other words, it is pointed at both ends, the bow and stern being of the same or nearly the same shape. Some lifeboats, however, do have a pointed bow and square stern. The hulls of lifeboats may be either of wood or metal. They are very sturdily built and are so designed as to be able to be used under conditions found at sea. They are intended to be propelled by oars or sails, and some are motor driven. On ocean and coastwise vessels, any lifeboat certified to carry 60 or more persons, if not one of the motor lifeboats, is fitted with a hand-operated propeller.

Those having a capacity of less than 60 persons may be equipped with hand-operated propelling gear. Hand-operated propelling gear is required on all such lifeboats not motor-driven, having a capacity of 60 persons or more, fitted on new vessels operating on the oceans or coastwise.

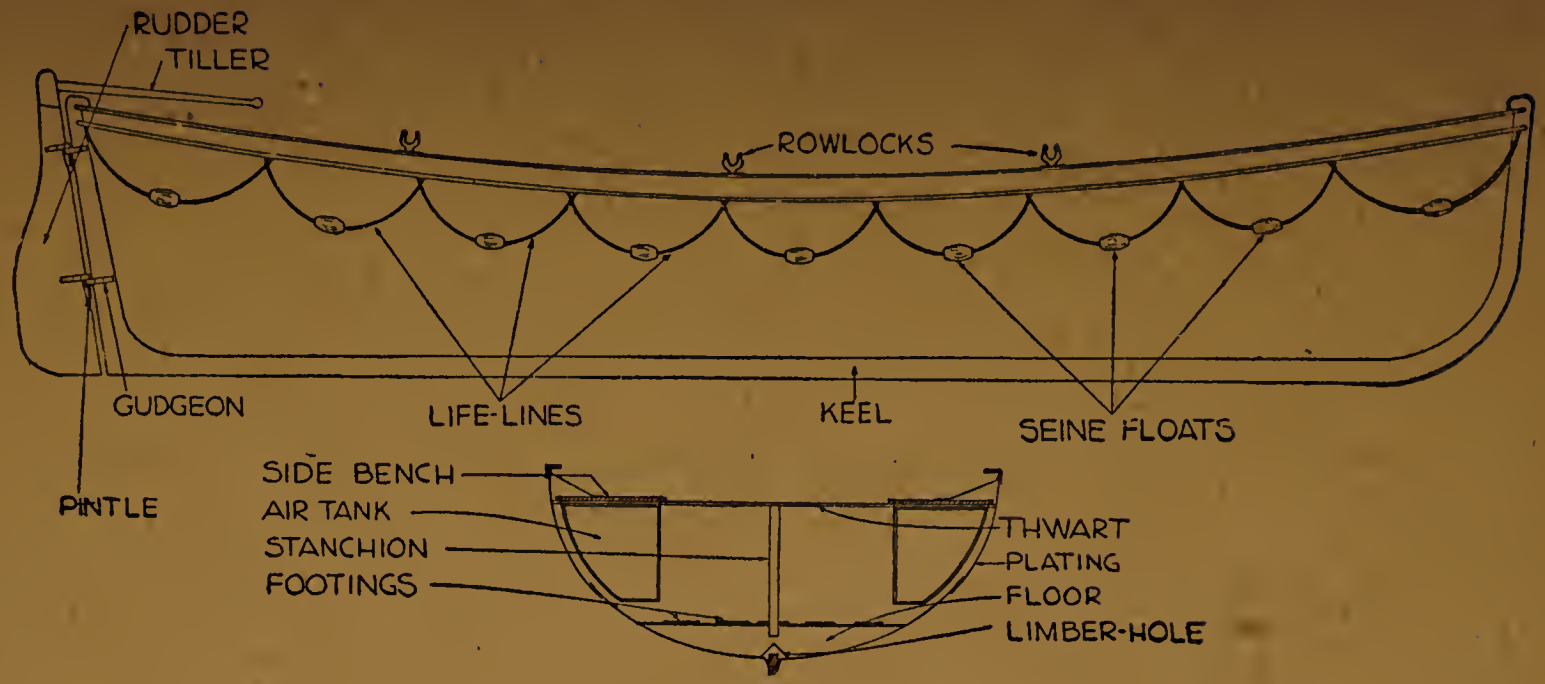
Every lifeboat must be equipped with a sufficient number of air tanks of suitable size and appropriately placed to keep it afloat when filled with water. Some lifeboats are constructed with the upper parts

of the sides collapsible; others are built on pontoons and have a well deck with either fixed or collapsible bulwarks.

All lifeboats are equipped with a life line or grab line, properly secured, the length of each side, festooned in bights not longer than 3 feet, with a seine float in each bight, hanging within 12 inches of the water.

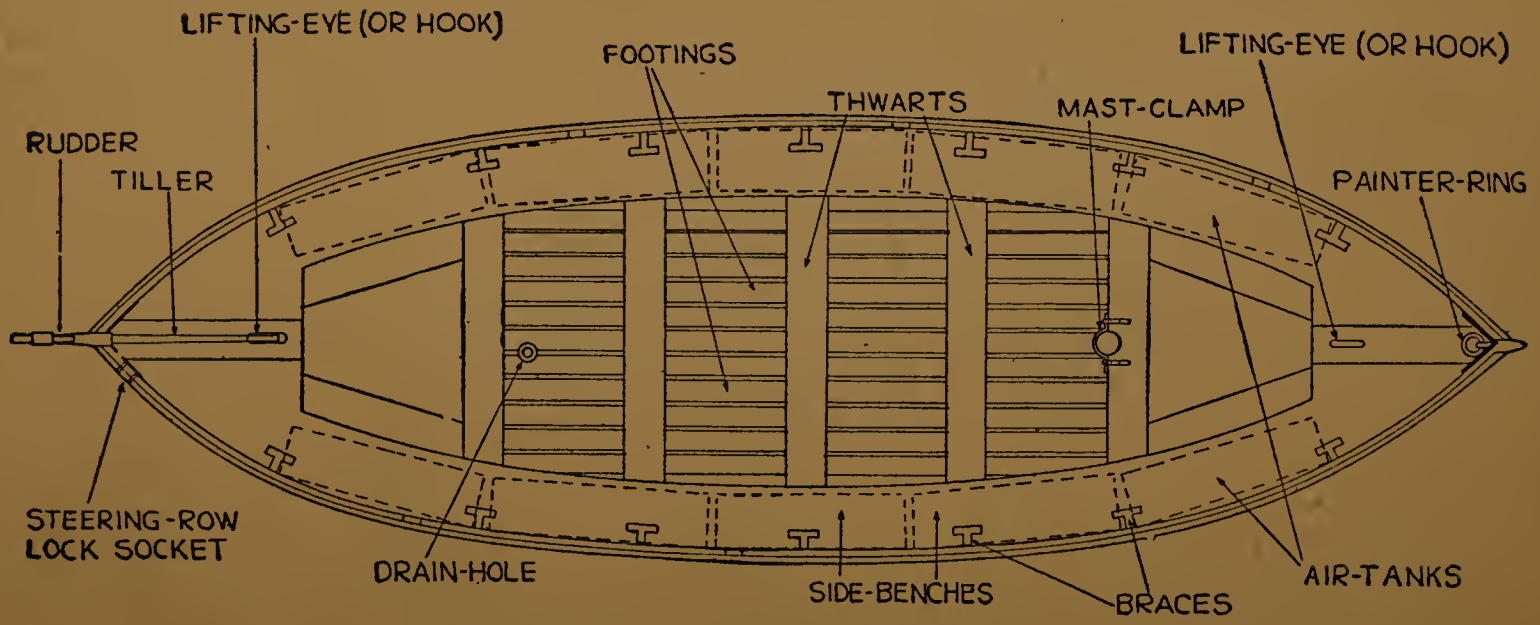
Every metallic lifeboat must be equipped with drain holes fitted with automatic plugs, and wooden lifeboats with drain holes fitted either with automatic plugs or with two plugs secured with chains for each hole.

The various parts of a lifeboat and their names are shown on Plates I and II, as also are some of the details of construction.



METALLIC LIFEBOAT

PLATE I



METALLIC LIFEBOAT

PLATE II

When built, a plate is affixed to every lifeboat by the builder on which is shown, among other things, the cubical contents of the boat and the number of persons the boat may carry. Every lifeboat must also have its cubical contents and the number of persons it is allowed to carry plainly marked or painted on each bow in letters and figures 1½ inches high. In addition, it must have the number of persons allowed to be carried plainly marked or painted on top of at least two of the thwarts in letters and figures not less than 3 inches high.

All lifeboats must have the vessel's name and the number of the boat plainly marked or painted on each bow in figures not less than 3 inches high. Where boats are carried on both sides of a vessel, lifeboat No. 1 is forward on the starboard side; lifeboat No. 2, forward on the port side; lifeboat No. 3, next abaft lifeboat No. 1 on the starboard side; lifeboat No. 4, next abaft lifeboat No. 2, on the port side, etc., the odd-numbered boats being on the starboard side and the even-numbered boats on the port side. When lifeboats are nested, the lifeboat under lifeboat No. 1 is numbered 1-A; the lifeboat under lifeboat No. 2 is numbered 2-A, etc.

The vessel's name must be marked on all its equipment, such as hatchets, oars, buckets, rafts, floats, tanks, etc.

Removal of vessel's name and home port under Wartime Regulations.—Vessels of 1,000 gross tons and over operating in coastal, intercoastal, or foreign trade are to have all exterior ship's identification and distinguishing marks removed, including the painting out of the name and hailing port. Portable name boards may be utilized when entering and departing from port as may be required.

No repairs or alterations, except in emergency, may be made to any lifeboat, lifeboat disengaging apparatus, life raft, or other appliance subject to inspection, without advance notice to the Officer in Charge, Marine Inspection.

Falls must be of such length that the lifeboat may be lowered to the water at the lightest seagoing draft with the vessel listed to 15°.

Lifeboat falls must at all times be ready for immediate use and must be protected from ice. On vessels over 1,000 gross tons, not fitted with mechanical means for lowering, covered tubs, boxes, or reels must be provided for the stowage of falls, and suitable lowering bitts must be fitted in easily accessible positions.

Every lifeboat must be stripped, cleaned, thoroughly overhauled, and painted at least once in every year.

The motor- and hand-operated propelling gear of each lifeboat must be operated under service conditions ahead and astern for a period of not less than 5 minutes at least once in every 7 days (Once in every 4 days under Wartime Regulations) in order that it may be ready for service at any time.

The decks on which lifeboats are carried must be kept clear of freight or any other obstructions which would interfere with the immediate launching of the lifeboats.

Passenger vessels must have one suitable ladder for each set of davits to enable passengers to descend to lifeboats and rafts. They must be kept ready for use on the boat deck. On passenger vessels where the boat deck is more than 30 feet from the lightest seagoing waterline, illumination must be furnished from the vessel for the lifeboats when being launched or while alongside.

Under Wartime Regulations cargo vessels and tank ships shall be provided with suitable ladders to enable persons to descend to lifeboats and rafts, one ladder to be provided for each set of boat davits. These ladders shall be kept ready and convenient for use on the boat deck and shall reach to the vessel's light load water line. Lifesaving nets are also required for each set of davits.

A licensed deck officer or a certificated lifeboatman must be in charge of each lifeboat or life raft on vessels engaged on ocean or intercoastal voyages. A licensed officer or a certificated able seaman must be in charge of each lifeboat or life raft on coastwise, Great Lakes, and bay and sound vessels.

A second in command of the boat or raft must also be designated. The person in charge must have a list of the crew of the boat or raft and must see that the crew are acquainted with their duties.

The signal for boat drill or boat stations consists of seven short blasts and one long blast of the vessel's whistle, and the same signal on the general alarm bell. Where whistle signals are used for handling boats, they are as follows: One short blast of the whistle is an order to lower the boats; two short blasts is an order to stop lowering the boats; three short blasts dismisses the crew from boat stations.

A lifeboat and fire drill must be held at least once a week, and on passenger vessels in which the voyage exceeds one week's duration, drills shall be held before leaving port. At boat drill, weather conditions permitting, boat covers and strongbacks must be removed, plugs put in, painters let out and tended, boat ladders secured in place, and all the boats must actually be swung out ready for lowering to the embarkation deck and frapped in, except in cases where more than one boat is handled from a set of davits, in which case all the outboard boats must be so swung out. The person in charge of each boat must see that all members of its crew are acquainted with their duties; whenever possible the boats should be lowered to the water and the crew instructed in handling the boats under oars, sail, or other power. At least once every 3 months, every member of the crew of a passenger vessel (except females), must participate in a drill in which he actually pulls an oar in a lifeboat.

WARTIME REGULATIONS:

Lifeboat and fire drills—On all vessels the master or person in charge is responsible for instructing all on board in the use and purpose of the emergency equipment provided and for the conduct of frequent drills illustrating its use. The master and officers are to drill their crews until all on board are thoroughly familiar with the use and purpose of all safe-

ty equipment; are able to row and are familiar with the procedure for lowering boats, launching rafts and are proficient in quickly donning their lifesaving suits, if carried. In this connection, a fire drill and lifeboat drill with a boat in the water and boat crews exercised in rowing is to be held in every port of loading or discharge. When the master is satisfied that each member of the crew thoroughly understands his duties, he may then require that lifeboat drills, including lowering of all boats and the exercise of each member of the crew in lowering the boats and rowing, be held at longer intervals, but in no case longer than 30 days, except where a vessel may be at sea for a longer period.

On vessels engaged in voyages of more than 3 days' duration, a lifeboat muster and fire drill are to be held at sea not less than once in every 4 consecutive days and the master and officers are to instruct all of the crew, with the exception of those who cannot be relieved of their immediate duties, in the use of the various equipment which are on the vessel and fitted in the lifeboats. On all ships which carry persons in addition to the crew as passengers, such persons are, where practicable, to be required by the master to participate in the lifeboat drills and receive instruction in the functioning and use of the various types of equipment.

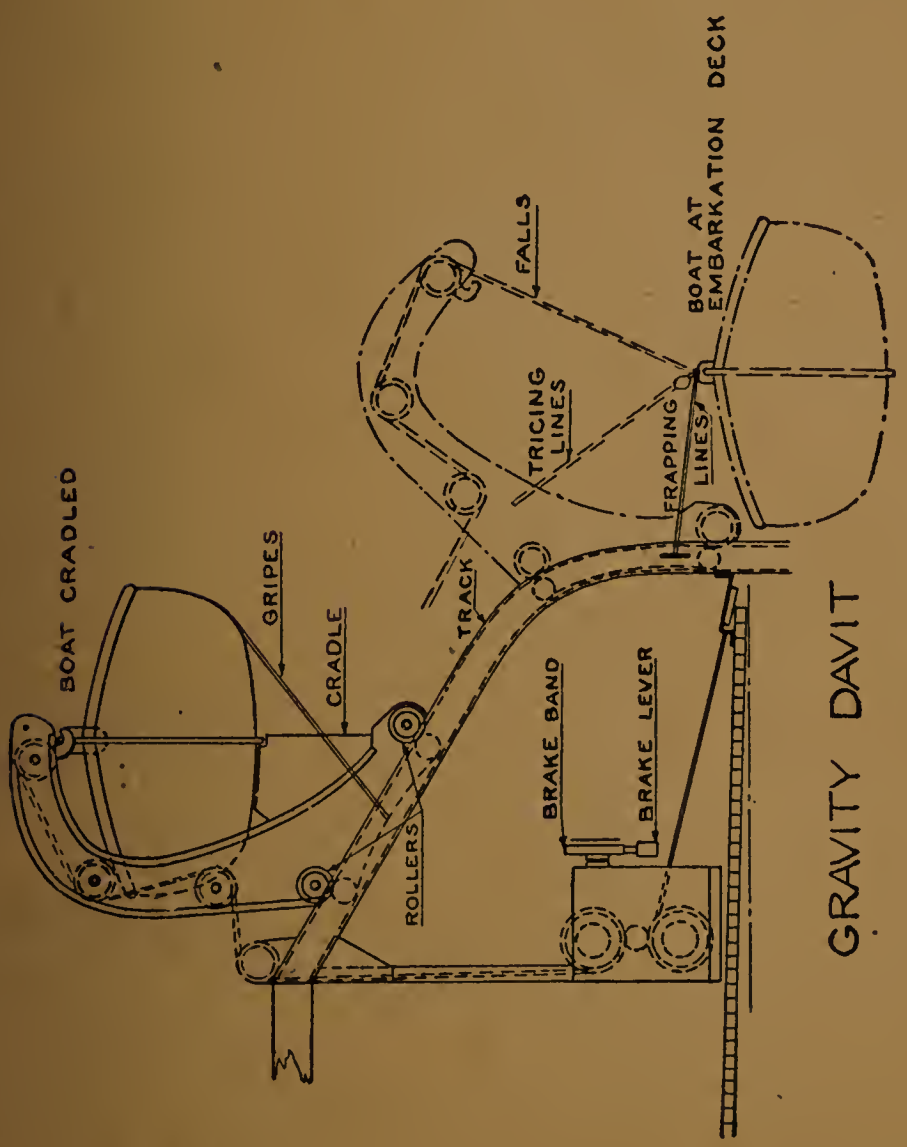
Under Wartime Regulations lifeboats must be carried in readiness for lowering—Masters shall, with due regard to safety, cause all lifeboats attached to davits other than gravity davits to be properly griped in the outboard position as will allow immediate lowering in case of emergency. On all vessels guys are to be rigged from the davit heads when the boats are carried in the outboard position.

LIFEBOAT DAVITS

Lifeboat davits are of three distinct types: Gravity, radial or round bar, and quadrantal.

With the gravity-type davits, the lifeboat is carried in two cradles, mounted on rollers which move over two parallel tracks at right angles to the

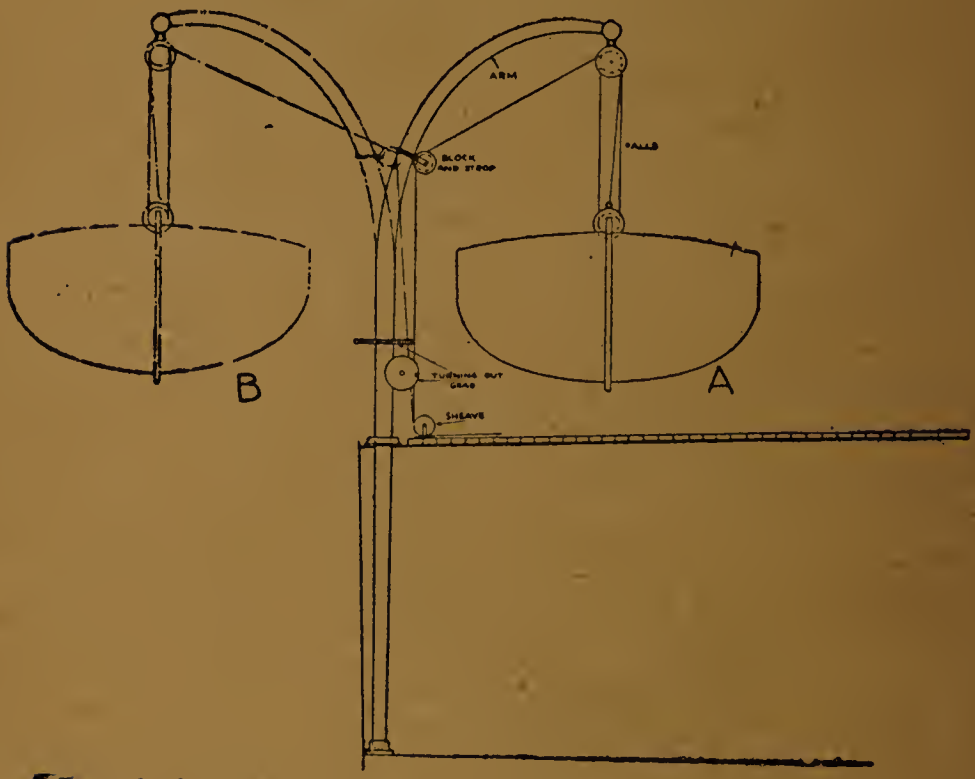
vessel's side. In operation, after gripes are released, a brake lever is raised which permits the lifeboat and the entire assembly to roll down the tracks by gravity, stopping with the lifeboat suspended over the side and at the embarkation deck. Tricing lines swing the boat in to the ship's side and hold it in that position until the frapping lines are passed around the falls, after which the tricing lines are cast adrift by tripping the pelican hooks. Raising the lever again permits the boat to continue down until it reaches the water. (See Plate III.)



GRAVITY DAVIT

PLATE III

With the radial or round-bar type davits, the lifeboat is carried on chocks, under davits which may be turned around so that the top describes an arc. In operation, the davits are both turned back until the bow of the boat clears the forward davit. The forward davit is then turned out so that the bow swings out, and the same procedure follows with the after davit, so that the boat is suspended over the side where it is frapped in to the embarkation deck. It is then lowered to the water by its falls. This type of davit must always be guyed. (See Plate IV.)

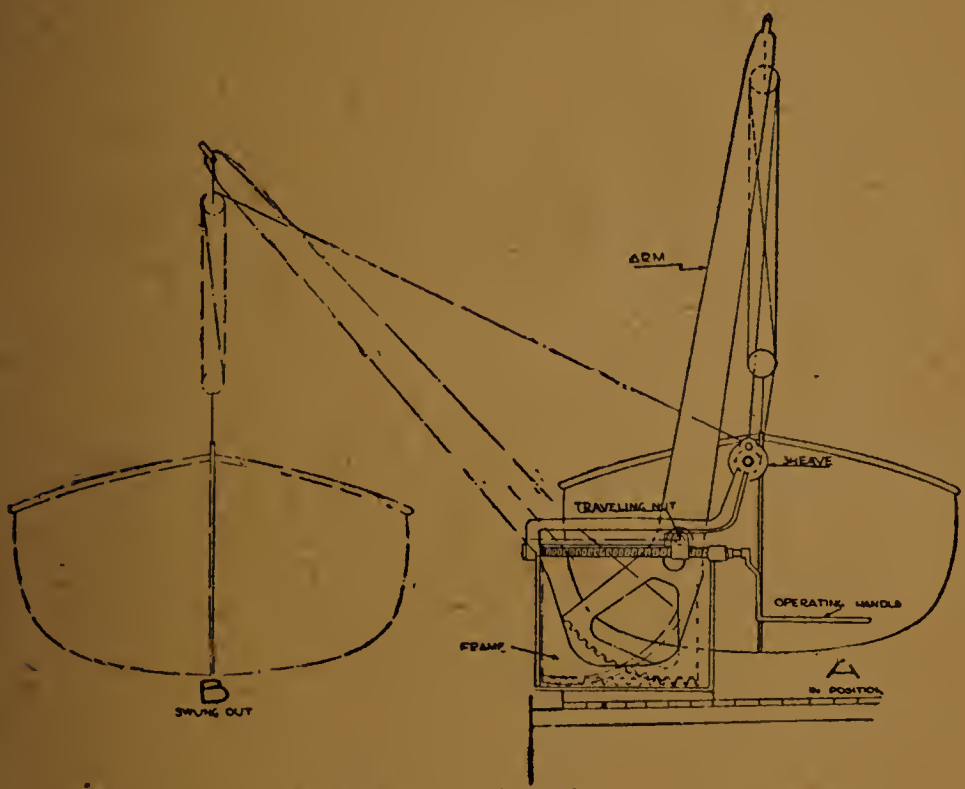


ROUND BAR OR RADIAL DAVIT

PLATE IV

With the quadrantal-type davits, the lifeboat is carried on chocks under the davits. The davits themselves stand upright, with the tops curved in toward each other so that the ends come directly above the hoisting hooks of the lifeboat. In operation, the davit, which is pivoted near the foot so that it will turn in an arc at right angles to the vessel's side, is

rotated outboard by a crank operating a worm gear, so that the boat is suspended over the side and frapped in to the embarkation deck. It is then lowered to the water in the usual manner by its falls. (See Plate V.)



QUADRANT DAVIT

PLATE V

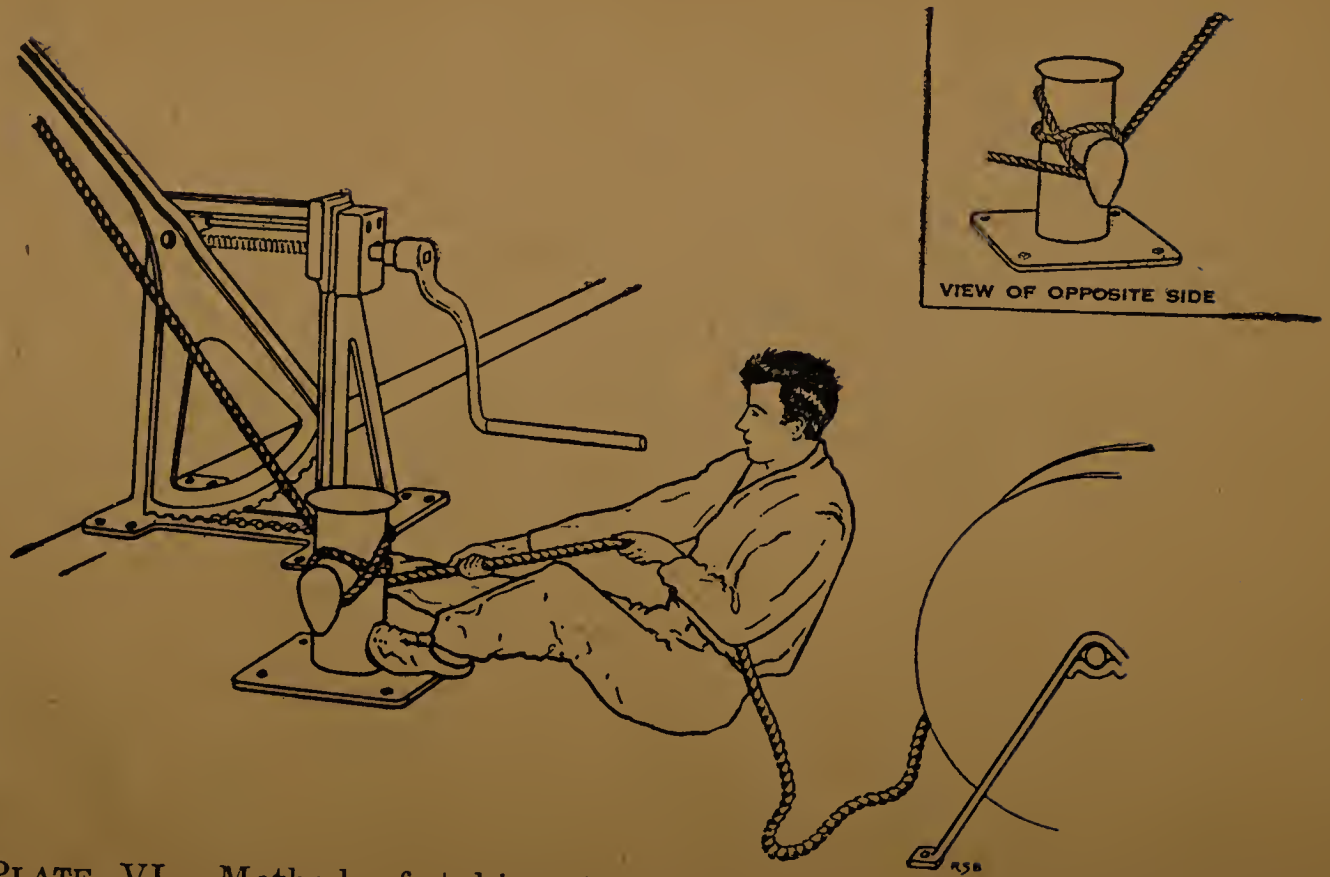


PLATE VI.—Method of taking turns and position for lowering away on cruciform bitt.

DISENGAGING APPARATUS

Releasing gear is installed in many lifeboats. Its purpose is to permit releasing both of the falls from the boat as soon as the boat is water-borne. There are several types of disengaging apparatus installed at present. One type consists of two releasing hooks one at each end of the boat, connected by a chain running from one end of the boat to the other.

The releasing hooks are hooks which are hinged on pins so that they may be rotated on the pins and upset. The chain between the two hooks is led along the side of the boat through fairleaders and is equipped with an operating grip in a convenient location near the stern. It is fastened to the releasing hooks in such a manner that a strain on the chain will cause the hooks to upset and thus free themselves from the falls.

In operation, a strain is put on the chain by pulling the operating grip as soon as the boat is water-borne, upsetting both hooks and freeing them from both falls simultaneously. Other types of releasing hooks are connected to rods or shafting running along the bottom of the boat, and are operated by means of a lever, functioning through universal joints, which disengages a pin at each end, releasing the hooks. Later types of disengaging apparatus are arranged for independent release by hand instead of simultaneous release.

All lifeboats constructed after January 1, 1944, for use on ocean and coastwise vessels of over 3,000 gross tons shall be fitted with an approved disengaging apparatus so arranged as to make it possible for the lifeboats to be launched while such vessels are under way or stopped, and for both ends of the boat to be released simultaneously by one person. The gears shall be capable of being released from one position in the boat while the boat is fully loaded with allowed persons and equipment. Simultaneous release shall be effected by partially rotating a shaft which shall be continuous and extend from point of contact with the hooks. The releasing gear shall be designed and installed so as to afford the least inter-

ference with stowage arrangements and the comfort of the occupants of the boat.

NOTE: Approval of all lifeboat disengaging apparatus installed on ocean and coastwise vessels of over 3,000 gross tons which does not conform with the above features is withdrawn effective January 1, 1944. This withdrawal of approval shall not affect existing installations or replacements.

LIFEBOAT EQUIPMENT

All articles of equipment for lifeboats must be of good quality, efficient for the purpose they are intended to serve, and kept in good condition. Lifeboats must be fully equipped before the vessel leaves port, and the equipment must remain in the boat throughout the voyage. It is unlawful to stow in any boat articles other than those required. All loose equipment must be securely attached to the boat to which it belongs.

LIFEBOAT EQUIPMENT—OCEAN AND COASTWISE

The following equipment is required on lifeboats on vessels navigating oceans or coastwise and includes all Wartime Regulations: The arrangement is not alphabetical but is believed to be in the most practical order for study. "Wartime Safety Measures for Merchant Marine" lists all equipment in alphabetical order together with detailed descriptions and valuable practical recommendations regarding its use.

1. *Wire span and life lines.*—At least four lifelines fitted to a span between the davit heads and knotted at three foot intervals.

2. *Grab rails.*—Below the turn of the bilge to provide handholds on a capsized boat.

3. *Life line.*—Of 12-thread manila festooned in 3 foot bights with a seine float in each bight.

4. *Painters.*—One painter of 2¾" manila and a length not less than three times the distance from boat deck to light water line, rigged as a sea

painter with strop, eye and toggle. Additional Painter, 15 fathoms of 2¾" manila secured to stem.

5. *Oars.*—Full complement of oars, two spare oars and a steering oar with rowlock or becket. Motor boats and boats propelled by hand operated propellers have 4 oars and 1 steering oar.

6. *Rowlocks.*—Set and a half thole pins or rowlocks attached to the boat by separate chains.

7. *Rudder and tiller.*—May also have yoke and yoke lines.

8. *Plugs and pumps.*—Each metallic lifeboat shall be fitted with an automatic plug. Drain holes, fitted with automatic plugs, shall be provided with two caps attached by chains. Decked lifeboats have no plugs, but must have two bilge pumps. All boats must have a bilge pump. 25 softwood plugs, 3" long and tapered from ¼" to ¾" for plugging bullet holes, in canvas bag.

9. *Propellers (hand operated).*—Lifeboats having a capacity of 60 persons or more must have same, except motorboats.

10. *Mast and sails.*—A mast or masts with at least one good mainsail and one suitable jib with proper gear for both, the sails and gear to be protected by a suitable canvas cover. New sails for lifeboats, as well as replacements for existing sails, are to be yellow or bright orange in color for the purpose of increasing their visibility on the water and from the air.

11. *Manila line.*—30 fathoms of 15-thread manila line.

12. *Canvas hood and side spray curtain.*—Hood to extend from stem to the mast but not less than about ⅓ the length of the boat aft and side spray curtain about 12" high and extending from after end of hood to the stern thwart and may be held in place by rods installed in the rowlock sockets.

13. *Boathooks.*—2, not less than 8 feet long by 1½" in diameter.

14. *Bailer.*—1, with lanyard attached.

15. *Bucket.*—1, galvanized iron, of 2 gal. capacity, with lanyard attached.

16. *Hatchets.*—2, with lanyards, one at each end of the boat.

17. *Locker.*—For storing smaller items of equipment.

18. *Compass.*—Liquid compass with at least a 2-inch card.

19. *Chart.*—1 current Pilot Chart of waters navigated, in a metal container.

20. *Lifepreservers.*—2, in addition to vessels quota.

21. *Sea Anchor.*—After 1 January, 1943, all new sea anchors and replacements for existing sea anchors shall be of a circular pattern with a mouth not less than 36 inches in diameter and having a length of not less than 5 feet from mouth to tip. The tip shall be arranged for securing therein a conical shape storm oil container of at least 1-gallon capacity.

22. *Storm Oil.*—1 gallon of vegetable or animal oil arranged for attachment to the sea anchor.

23. *Lantern.*—1, ready for immediate use and containing sufficient oil to burn at least 9 hours. Lamp Wicks—2, in a waterproof container.

24. *Illuminating Oil.*—1 gal., in a metal container.

25. *Massage Oil.*—1 gal., suitable for massaging feet and legs.

26. *Matches.*—3 boxes of friction matches in a watertight container, stowed in locker or secured to the underside of the stern thwart.

27. *Ditty bag.*—Containing palm, needles, sail-twine, marlin and marlinspike.

28. *Flashlight.*—1, metal, of focusing type, in a portable watertight, metal case with an extra bulb and three extra batteries. Batteries not to be used after one year from date of manufacture.

29. *Signal pistol.*—1, with lanyard attached and 12 parachute signal cartridges in a portable watertight metal case; cartridges to be: 20,000 c.p.,

height 150 feet and burn 30 seconds—not to be used after 4 years from the date of manufacture.

30. *Distress lights.*—A watertight metal case containing 12 self-igniting red lights capable of burning and giving forth a brilliant red flame of not less than 500 c.p. for 2 minutes.

31. *Provisions.*—14 ounces of biscuits known as type "C" rations; 14 ounces pemmican; 14 ounces chocolate tablets in waterproof packages or an additional 14 ounces biscuits type "C" rations, 14 ounces milk tablets in waterproof packages or containers. Provisions are to be stowed in air-tight metal receptacles.

32. *Drinking water.*—Tanks containing at least ten quarts of water for each person.

33. *Drinking cups.*—3 cups, 2 of bucket type with chain or lanyard, and marked for rationing water in ½ ounce measure.

34. *First Aid kit.*—In watertight metal container; scissors, bandages, tourniquet, dressings, cotton, tape, pins, iodine, ointment, splints, etc., and instructions in First Aid.

35. *Blankets.*—6, woolen, in waterproof covers.

36. *Signal Flag.*—1 yellow or bright orange bunting flag to be attached to boat hook to attract air craft.

37. *Fishing Kit.*

38. *Signaling mirrors.*—2.

39. *Daytime smoke Distress Signals.*—4.

Hermetically sealed water containers—At present there are available hermetically sealed cans containing approximately one and two-thirds quarts of especially treated water. The use of such water containers is highly desirable and is recommended, as water stored in this manner is protected from contamination and will remain potable over a long period. These containers, which are approximately 8″ by 4½″ by 3″, can be readily stowed in the drinking water tanks and other compartments in the boat.

MOTOR LIFEBOATS: On all ships of 3,000 gross tons and over which are certificated for the first time

after Jan. 1, 1943 one of the lifeboats on each side shall be motor-propelled.

Motor lifeboats may be used with advantageous results such as quickly getting away from the side of a rapidly sinking vessel, or when the vessel and adjacent water is on fire, performing rescue work at sea, tending and towing nonpropelled lifeboats, rafts or floats, etc.

ADDITIONAL EQUIPMENT FOR MOTOR LIFEBOATS

In addition to being provided with all equipment required for lifeboats, motor lifeboats carry the following additional equipment:

1. *Mast and sail.*—Not required by peacetime regulations but specified under Wartime Regulations in order to sail the boat to port after it has performed its function and run out of fuel.
2. *Motor.*—Of slow-speed heavy-duty type, capable of at least 6 knots when loaded in calm water and with provisions for going astern.
3. *Fuel.*—Sufficient for 24 hours continuous operation.
4. *Fire extinguishers.*—Two 1-quart size carbon tetrachloride type fire extinguishers.
5. *Bilge pumps.*—2, if over 100 persons capacity, one to be hand operated.
6. *Searchlight.*—To swing all-around and 60° up and 45° down, with two spare bulbs; to be operated from the same source as the radio, intermittently for 6 hours and continuously for 3 hours.
7. *Radio.*—Receiving and transmitting set with a range of 50 miles by day; the power supply to operate it for 6 hours continuously and to operate both the radio and searchlight simultaneously.

NOTE: See sketch on "Efficient Method of Stowing Lifeboat Equipment" in "Wartime Safety Measures for Merchant Marine."—Figure 16 of the 1st edition and Figure 26 of the 2nd edition.

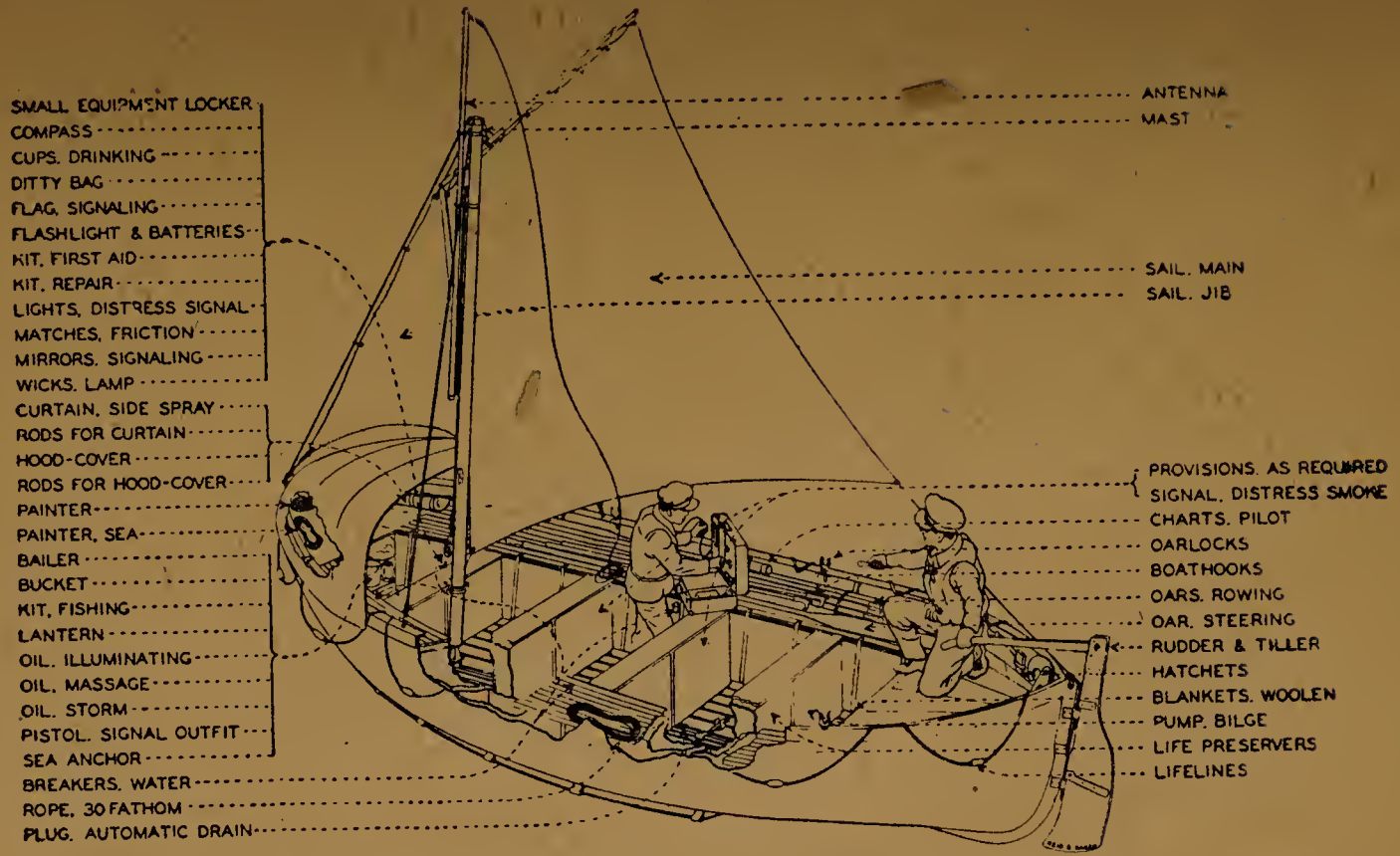
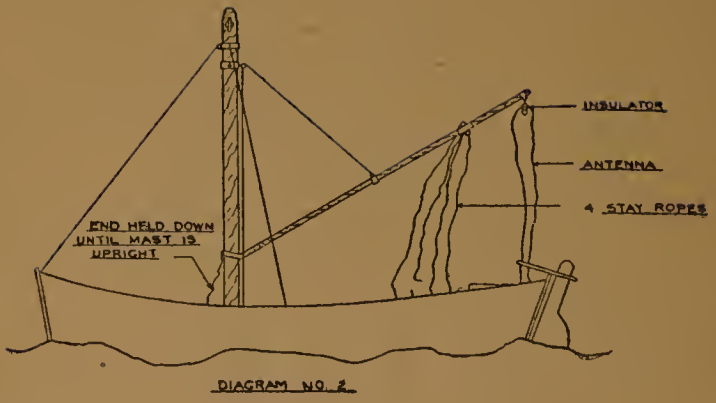


PLATE VII.—Stowage of Lifeboat Equipment.



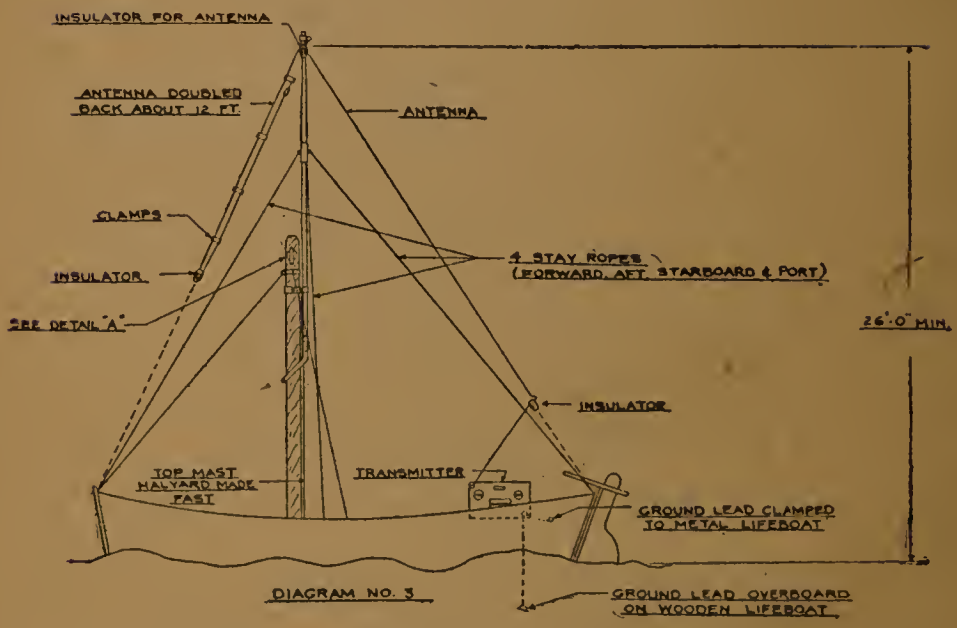


PLATE VIII.—Arrangement for lifeboat antenna mast (wooden).

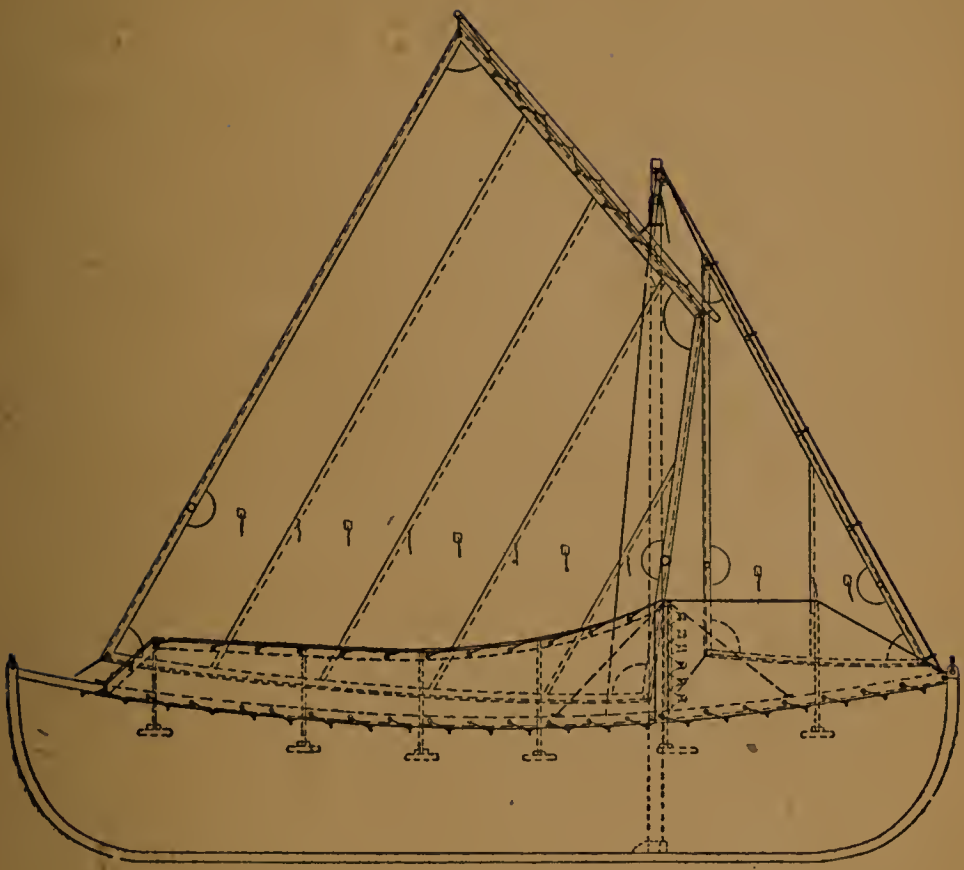


PLATE IX.—Rig of sail and jib.

The following list of required equipment has been prepared for convenience in checking contents of lifeboats.

EQUIPMENT FOR LIFEBOATS ON OCEAN AND COASTWISE SELF-PROPELLED VESSELS

Bailer
Bilge pump
Blankets, 6
Boathooks, 2
Bucket
Canvas hood and side spray curtain
Chart
Compass
Daytime distress signals, 4
Distress lights, 12
Ditty bag
Drinking cups, 3 (2 of well bucket type)
First-aid kit
Fishing kit
Flashlight, extra lamp and 3 extra 3-cell batteries
Hatchets, 2
Illuminating oil, 1 gal.
Lantern, 2 additional wicks
Life line
Life preservers, 2
Locker
Manila line
Massage oil, 1 gal.
Mast, sail, and jib
Matches, 3 boxes
Oars
Painters
Plugs, drain
Propellers, hand-operated
Provisions, 56 oz. per person
Rowlocks
Rudder and tiller
Sea anchor
Signal flag
Signaling mirrors, 2
Signal pistol, 12 cartridges

Storm oil, 1 gal.
Water, 10 qts. per person
Wooden bullet-hole plugs, 25

LIFEBOAT EQUIPMENT—GREAT LAKES

The following equipment is required on lifeboats on vessels navigating the Great Lakes:

1. *Bailer*—1, with lanyard attached.
2. *Boathook*—1, not less than 8 feet long by 1½" in diameter.
3. *Bucket*—1, galvanized iron, of about 2 gallons capacity, with lanyard attached.
4. *Compass*—1, efficient liquid compass with not less than a 2-inch card.
5. *Distress lights*—1 watertight metal case containing 12 self-igniting red lights capable of burning at least 2 minutes and to give forth a brilliant red flame of not less than 500 candlepower. Either a flashlight or an approved signal pistol with 12 approved parachute signal cartridges may be substituted for 6 of the above distress lights, but at least 6 of the above lights shall be carried.
6. *Flashlight*—(Optional as above, 1, metal, of focusing type, in a portable watertight, metal case with an extra bulb and three extra batteries. Batteries not to be used after one year from date of manufacture.
7. *Hatchets*—2, attached by lanyards, one at each end of the boat.
8. *Illuminating oil*—1 gallon in a metal container.
9. *Lantern*—1 lantern containing sufficient oil to burn at least 9 hours and ready for immediate use.
10. *Life line*—1 life line properly secured entirely around the sides and ends of the buoyant apparatus, festooned to the gunwales in bights not longer than 3 feet with seine float in each bight.
11. *Life preservers*—2, in addition to vessel's quota.

12. *Matches*—1 box of friction matches in a watertight container, carried in a box secured to the underside of the stern thwart or stowed in the locker.

13. *Oars*—A full complement of oars, two spare oars and a steering oar with rowlock or becket. Motor lifeboats and lifeboats fitted with propellers operated by hand are equipped with four oars and one steering oar.

14. *Painter*—Of manila rope not less than 2¾" in circumference and of a length not less than 3 times the distance between the boat deck and the light draft.

15. *Plugs*—Each drain hole, fitted with an automatic plug, shall be provided with two caps attached by chains. Where an automatic plug is not provided for the drain hole, there shall be two plugs attached by chains.

16. *Rowlocks*—1 set and a half of thole pins or rowlocks attached to the boat by separate chains.

17. *Rudder*—1 rudder with tiller or yoke and yoke lines.

18. *Sea anchor*—After 1 January, 1943, all new sea anchors and replacements for existing sea anchors shall be of a circular pattern with a mouth not less than 36 inches in diameter and having a length of not less than 5 feet from mouth to tip. The tip shall be arranged for securing therein a conical shape storm oil container of at least 1-gallon capacity.

19. *Signal pistol*—(Optional as in No. 5) With lanyard attached and 12 parachute signal cartridges in a portable watertight metal case; cartridges to be: 20,000 c.p., height 150 feet and burn 30 seconds, not to be used after 4 years from the date of manufacture.

20. *Storm oil*—1 gallon of vegetable or animal oil in a container arranged for attachment to the sea anchor.

LIFEBOAT EQUIPMENT—BAYS, SOUNDS AND LAKES

The following equipment is required on lifeboats on vessels navigating bays, sounds, and lakes, other than the Great Lakes:

1. *Boathook*—1, of suitable length but not less than 8 feet long by 1½ inches in diameter.

2. *Bucket*—1, galvanized iron of about 2 gallons capacity, with lanyard attached.

3. *Hatchet or ax*—1, with lanyard attached.

4. *Lantern*—1, containing sufficient oil to burn at least 9 hours and ready for immediate use.

5. *Life line*—Properly secured the entire length of each side, festooned in bights not longer than 3 feet, with a seine float in each bight. The life line shall be of a size and strength not less than 12-thread manila rope, and the seine float in each bight shall hang to within 12 inches of the surface of the water when the boat is light.

6. *Life preservers*—2, in addition to the vessel's quota.

7. *Matches*—1 box of friction matches in a watertight container and carried in a box secured to the underside of the stern thwart or stowed in the locker.

8. *Oars*—A full complement of oars and two spare oars. Motor lifeboats and lifeboats fitted with propellers operated by hand shall be equipped with 4 oars and 1 steering oar.

9. *Painter*—Of manila rope not less than 2¾ inches in circumference and of a length not less than 3 times the distance between the boat deck and the light draft.

10. *Plugs.*—Each drain hole, fitted with an automatic plug, shall be provided with two caps attaached by chains. Where an automatic plug is not provided for the drain hole, there shall be two plugs attached by chains.

11. *Rowlocks.*—One full complement of rowlocks and two spare rowlocks, each rowlock attached to the boat by a separate chain.

12. *Steering oar or rudder.*—1 steering oar with rowlock or becket, or rudder with tiller or yoke and yoke lines.

LIFE RAFTS, LIFE FLOATS AND BUOYANT APPARATUS

Life rafts, life floats and buoyant apparatus differ markedly in their design from lifeboats. They are of various shapes and are so constructed as to be entirely reversible, i. e., they may be used equally well with either side up. Buoyant apparatus must not weigh over 200 pounds. It must be equipped with either a line becketed around the outside, or pendant, or both, to accommodate the number of persons allowed.

All life rafts, life floats, and buoyant apparatus must be of such size, weight, and strength that they may be thrown from a vessel's deck if necessary.

Every life raft and life float must carry a builder's plate showing, among other things, the number of persons it may carry. In addition, there must be stenciled on it the number of persons it may carry. Every piece of buoyant apparatus must carry a builder's plate showing, among other things, the dimensions and the number of persons allowed, and also it must bear the words "Buoyant apparatus."

All life rafts, life floats and buoyant apparatus must be stripped, cleaned, thoroughly overhauled and painted at least once in every year.

The decks on which life rafts, life floats and buoyant apparatus are carried must be kept clear of freight or any other obstruction that would interfere with their immediate launching, or with the launching of the lifeboats. Buoyant apparatus must be stowed so as not to interfere with the prompt handling of lifeboats or the marshalling of persons at embarkation stations, and shall be stowed in such manner as to be readily launched.

Wartime Regulations require life rafts to be stowed on skids, launching ways or other alternative means to provide quick release of the rafts directly into the water and arranged so that they would have the best

change of floating free of the ship if there is no time to launch them. (See PLATE X on life raft release arrangement.)

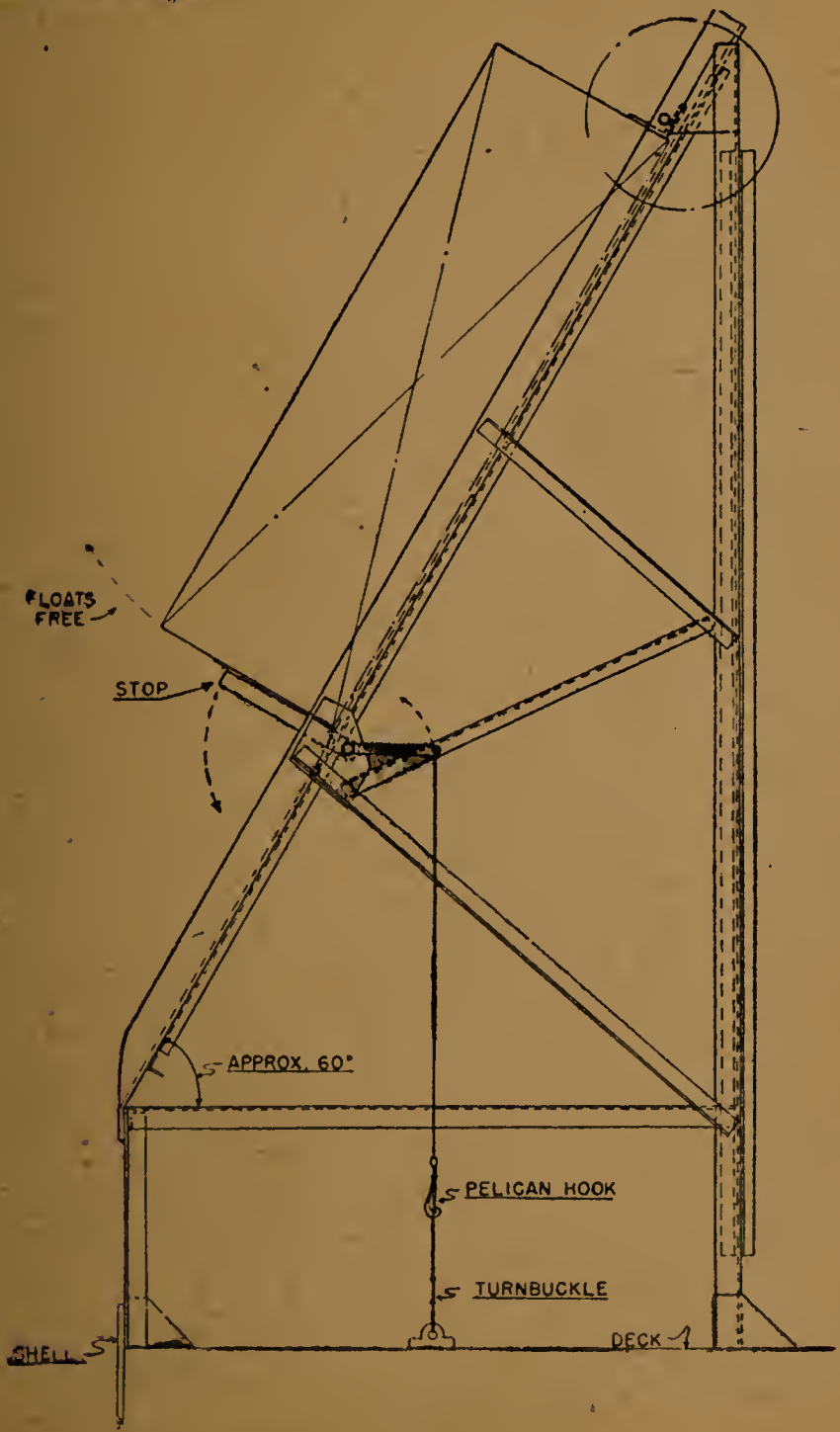


PLATE X.—Life raft release arrangement.

LIFE RAFT, LIFE FLOAT, AND BUOYANT APPARATUS EQUIPMENT

Articles of equipment for life rafts, life floats, and buoyant apparatus must be of good quality, efficient for the purpose they are intended to serve, and must be kept in good condition. Life rafts, life floats, and buoyant apparatus must be fully equipped before the vessel leaves port and the equipment must remain in them throughout the voyage. Nothing except the equipment required by law may be stowed in them. Loose equipment must be attached to a raft, float, or buoyant apparatus to which it belongs.

LIFE RAFT EQUIPMENT—OCEAN AND COASTWISE

The following equipment, including Wartime Regulations, is required on new life rafts on vessels navigating oceans or coastwise.

1. *Blankets.*—4, in waterproof covers.
2. *Boathook.*—1, not less than 8′ long by 1½″ in diameter.
3. *Bucket.*—1, galvanized iron, two-gallon capacity, with lanyard attached.
4. *Canvas hood and protective curtain.*—Portable spray curtains shall be provided on all sides extending at least 12 inches above the seats. An easily rigged windbreaker and canopy shall also be provided to protect the occupants from the weather and to enclose and cover the area within the bulwark. The canopy shall be so arranged that it can be used to catch rain water. The side curtains shall be provided with means to allow rowing the raft when the curtains are in place.
5. *A Hydrographic Office (U. S. Navy) pilot chart*, reasonably current of the waters navigated, in a watertight container (similar to a sounding tube case).
6. *Compass.*—1 efficient liquid compass with not less than a 2-inch card.
7. *Daytime distress signals.*—At least four approved daytime distress signals.

8. *Distress signals.*—12 self-igniting red lights in a watertight metal case, container to be same as required for lifeboats.

9. *Ditty bag.*—1 canvas bag containing sail-maker's palm, needle, sail twine, marline, and marlinspike.

10. *Drain plugs.*—1 plug for each drain hole and two spare plugs accessible from either side of raft.

11. *Drinking cups.*—2, enameled, or otherwise suitable, drinking cups. One of the cups shall be suitably marked for measuring in one-half ounce sections for extracting water from container and rationing water.

12. *Electric water light.*—1 electric water light of approved type with lanyard for attaching to the raft.

13. *First-aid kit.*—In a watertight metal container, to be of approved type.

14. *Fishing Kit.*

15. *Flashlight.*—1 approved flashlight with one extra lamp in a watertight metal case and one extra set of batteries.

16. *Hatchet.*—1, with lanyard attached.

17. *Illuminating oil.*—1 gallon, in oil-tight metal container.

18. *Lantern.*—1, with two extra lamp wicks (Oil to be stowed separately—not in lantern.)

19. *Life line.*—1, properly secured entirely around the sides and ends of the raft, festooned in bights not longer than 3 feet with seine float in each bight. Suitable hand rails may be substituted for life line and seine floats.

20. *Life preservers.*—2 approved life preservers.

21. *Line.*—At least 15 fathoms of 12-thread manila.

22. *Massage oil.*—1 gallon of oil of a type suitable for massaging the feet and legs.

23. *Mast and sail.*—A suitable mast and sail with proper gear for each. Sail shall be yellow or bright orange in color.

24. *Matches.*—At least two boxes, in a watertight container.

25. *Oars.*—5 oars.

26. *Painter.*—1, of manila rope not less than 2¾" in circumference and a length not less than three times the distance between the boat deck and the light draft.

27. *Provisions.*—14 ounces biscuits "Type C" rations; 14 ounces of Pemmican; 14 ounces of chocolate tablets or an additional 14 ounces of biscuits; 14 ounces of milk tablets in waterproof packages or containers. The provisions shall be stowed in air-tight receptacles.

28. *Rowlocks.*—5, with chains connected for attachment near sockets, one for use with a steering oar.

29. *Sea anchor.*—1 approved sea anchor as required for lifeboats.

30. *Signaling Mirrors.*—2.

31. *Signal pistol.*—A signal pistol outfit consisting of an approved pistol with lanyard and 12 approved parachute red signal cartridges, all contained in a watertight metal case properly marked.

32. *Storm oil.*—1 container holding 1 gallon of vegetable or animal oil so constructed that the oil can be easily distributed on the water, and so arranged that it can be attached to the sea anchor.

33. *Water.*—A quantity of water equal to ten quarts per person divided in at least two containers of approximately equal capacity.

34. *Wooden plugs.*—25 soft wood plugs 3" long, tapered from ¼" to ¾" diameter.

Under Wartime Regulations passenger vessels require 25% additional life raft capacity. Cargo vessels require 100% additional life raft capacity. Life rafts shall be not less than 15 persons capacity and at least four rafts must be carried.

BUOYANT APPARATUS EQUIPMENT OCEAN AND COASTWISE

The following equipment is required on buoyant apparatus on vessels navigating oceans or coastwise.

1. *Life line.*—1 life line properly secured entirely around the sides and ends of the buoyant apparatus, festooned to the gunwales in bights not longer than 3 feet with seine float in each bight.

2. *Painter.*—1 painter of sufficient strength properly secured to the buoyant apparatus so that the buoyant apparatus may be lowered from the deck where stowed to the water. It shall be of good quality manila rope not less than 2 inches in circumference and at least equal in length to the height of the boat deck where stowed to the vessel's light seagoing draft plus 6 feet.

3. *Self-igniting water light.*—1 self-igniting electric water light of approved type, attached to the float by a suitable lanyard.

NOTE: Buoyant apparatus designed to accommodate less than 25 persons shall not be required to be equipped with a self-igniting water light. Such apparatus weighing less than 75 pounds shall not be required to have a painter for lowering.

LIFE FLOATS

Two life floats of at least 15-person capacity are required on all ocean and coastwise mechanically propelled vessels of 1,000 gross tons and over. These floats are stowed in such location that they may be launched directly overboard and so arranged that they would have the best chance of floating free of the ship if there is no time to launch them. Their equipment consists of an electric water light attached by a suitable lanyard and at least two paddles lashed to the sides of the float. The usual stowage for such floats is aft. One float may, however, be stowed in such other position as may be designated by the master.

COLOR OF WATER LIGHTS.—Water lights attached to life floats and life rafts show a white light. The life preserver light being red thus enables men to distinguish floating buoyant equipment from personnel.

LIFE RAFT EQUIPMENT—GREAT LAKES

The following equipment is required on life rafts on vessels navigating the Great Lakes:

1. *Boathook.*—1, of suitable length but not less than 6 feet long by 1½ inches in diameter.
2. *Distress lights.*—1 watertight metal case containing six self-igniting red lights of the same character as the distress lights required for lifeboats.
3. *Life line.*—A life line properly secured entirely around the sides and ends of the life raft, festooned in bights not longer than 3 feet, with a seine float in each bight. The life line shall be of a size and strength not less than 12-thread manila rope.
4. *Matches.*—1 box of friction matches in a watertight container.
5. *Oars or paddles.*—4 oars and one steering oar for all life rafts for seven persons and over. The oars shall be of suitable size but not less than 8 feet in length. Two paddles for all life rafts for six persons or less. The paddles shall be of suitable size but not less than 5 feet in length.
6. *Painter.*—1 painter of manila rope not less than 2¾ inches in circumference and of a length not less than three times the distance between the boat deck and the light draft.
7. *Rowlocks.*—On life rafts for seven persons and over, five rowlocks attached by separate chains in such a manner that they may be used from either side of the raft. A becket may be substituted for the steering oar rowlock.
8. *Sea anchor.*—1 sea anchor constructed of good quality canvas or other satisfactory material; and, if of circular pattern, to be not less than 2 feet in diameter.

9. *Self-igniting water light.*—1, of approved type, attached to the life raft by a manila lanyard of about 15-thread, 3 fathoms in length.

10. *Storm oil.*—1 gallon of vegetable or animal oil in a container so constructed that the oil can be easily distributed on the water, and so arranged that it can be attached to the sea anchor.

LIFE FLOAT EQUIPMENT—GREAT LAKES

The following equipment is required on life floats on vessels navigating the Great Lakes:

1. *Boathook.*—1, of suitable length but not less than 6 feet long by 1½ inches in diameter.

2. *Life line.*—A life line properly secured entirely around the sides and ends of the float, festooned in bights not longer than 3 feet, with a seine float in each bight. The life line shall be of a size and strength not less than 12-thread manila rope.

3. *Paddles.*—4.

4. *Painter.*—1 painter of manila rope not less than 2¾ inches in circumference, and of a length not less than three times the distance between the boat deck and the light draft.

5. *Self-igniting water light.*—1 self-igniting water light of approved type attached to the float by a manila lanyard of about 15-thread, three fathoms in length.

LIFE RAFT EQUIPMENT—BAYS, SOUNDS AND LAKES

The following equipment is required on life rafts on vessels navigating bays, sounds, and lakes other than the Great Lakes:

1. *Boathook.*—1, of suitable length but not less than 6 feet long by 1½ inches in diameter.

2. *Life line.*—Properly secured entirely around the sides and ends of the life raft, festooned in bights not longer than 3 feet, with a seine float in each bight. The life line shall be of a size and strength not less than 12-thread manila rope.

3. *Oars or paddles.*—4 oars and one steering oar for all life rafts for seven persons and over.

The oars shall be of suitable size but not less than 8 feet in length. Two paddles for all life rafts for six persons or less. The paddles shall be of suitable size but not less than 5 feet in length.

4. *Painter.*—1 painter of manila rope not less then 2¾ inches in circumference and of a length not less than three times the distance between the boat deck and the light draft.

5. *Rowlocks*—On life rafts for seven persons and over, five rowlocks attached by separate chains in such a manner that they may be used from either side of the raft. A becket may be substituted for the steering oar rowlock.

LIFE FLOAT EQUIPMENT—BAYS, SOUNDS AND LAKES

The following equipment is required on life floats on vessels navigating bays, sounds, and lakes other than the Great Lakes:

1. *Boathook.*—1, of suitable length but not less than 6 feet long by 1½ inches in diameter.

2. *Life line*—Properly secured entirely around the sides and ends of the float, festooned in bights not longer than 3 feet, with a seine float in each bight. The life line shall be of a size and strength not less than 12-thread manila rope.

3. *Paddles.*—4.

4. *Painter*—Of manila rope not less than 2¾ inches in circumference, and of a length not less than three times the distance between the boat deck and the light draft.

Some of the Wartime Regulations and Recommendations which are of special interest to lifeboatmen and able seamen are reprinted below. All seamen are urged to study "Wartime Safety Measures for Merchant Marine" for more detailed information.

Life-preserver light

A life-preserver light of an approved type shall be provided for each person which, when actuated, shall show a red light. Such lights are to be attached to the individual life preserver when worn

and are to be provided with means for readily transferring light to the lifesaving suit. Red light is utilized to distinguish men from rafts and floats which show a white light. Men will not then be swimming towards each other. Life-preserver lights should be worn with preserver at all times when practicable.

LIFESAVING SUITS

Lifesaving suits.—Ocean and coastwise cargo and tank vessels of over 1,000 gross tons shall be equipped with one approved lifesaving suit for each person employed thereon by the operator of the vessel.

Purpose.—The lifesaving suit is designed to perform two basic services; First, it keeps a seaman dry if it becomes necessary for him to go overboard directly into the water; by keeping his body and clothing reasonably dry the wearer will have a better chance for survival both in the water and after he is picked up. Second, the lifesaving suit serves as an exposure garment in lifeboat or raft; in cold latitudes in severe weather the lifesaving suit provides invaluable protection against shock, freezing, and other conditions brought about as a result of exposure in open lifeboat or raft.

Knowledge of suit—Life jacket—Inner clothing.—The lifesaving suit must always be worn with and over an approved kapok life preserver, never without it. Clothing worn under the suit should be as warm as required when navigating in winter or cold latitudes. The lifesaving suit is designed to keep the body reasonably warm and dry when immersed or when in an open lifeboat or raft. It has weighted feet to cause the wearer to float in the water in an upright position. The lifesaving suit achieves its buoyancy from the kapok life preserver which is worn underneath the suit, consequently, if through accident the lifesaving suit should become flooded with water the actual displacement of water by the suit is so slight that the wearer will lose little of his buoyancy. Furthermore, by loosening the straps at the ankles, opening the neck wide, and dropping the

suit over the shoulders, the lifesaving suit may be entirely removed in the water.

Accessibility.—Although it is conceivable that the lifesaving suit may be worn on watch in severe weather or under other similar conditions, its primary use is in time of a sinking. Consequently, it is urged that the suits be kept where they will be readily obtainable for emergency use. Drills in handling suits should be held at frequent intervals. With practice the suit can be put on and closed up in seventy-five seconds or less.

Care—Repair kit—Lifesaving suits are made of critical materials—either rubber or synthetic rubber—and may be difficult to replace if damaged. Therefore they should be handled and stored with care. Keep lifesaving suits away from oil, grease, excessive heat such as steam pipes, and do not drag over sharp or jagged edges. Emphasis should be placed on the fact that each suit is an individual piece of lifesaving equipment and the responsibility for its satisfactory care and use is an individual obligation. Each vessel should carry a repair kit containing sufficient materials for easily repairing rips, tears, and other damages. When not in use suit should be stowed in a cool dry place. Do not stow suit away until dry. It should be placed on a suitable hanger with soles of boots just resting on the deck to take some of the weight. This will prevent fabric from cracking. Stowed in this manner care should be exercised to prevent damage by friction due to rolling of the ship. Where space is limited, suit may be carefully folded and stowed where readily accessible.

① Life preserver is necessary and must be worn with suit. Where time permits, suit should be donned with shoes on.

PLATE XI

② Keep suit in a convenient place with tops of boots turned inside out. Step into suit with or without removing shoes as shown.

PLATE XI

③ Stand erect grasping suit with both hands and draw it evenly over shoulders.

PLATE XI

④ Insert one arm in sleeve normally, but second arm should be inserted into suit elbow first as shown.

PLATE XI

⑤ Grasp hood and pull over head. Slide metal fastener up to within two or three inches of chin.

PLATE XI

⑧ Squat and press air out of legs and body of suit. This is important. Close neck closure by pushing metal fastener snug against throat.

PLATE XI

⑦ Tighten ankle straps and wrist straps so that suit is adjusted to your size. You are now ready to enter water.

When not in use suit should be stowed in a cool dry place. It should be placed on a suitable hanger with soles of boots just resting on the deck to take some of the weight. This will prevent fabric from cracking. Where space is limited, suit may be carefully folded and stowed where readily accessible, but should not be placed near steam pipes and should be kept from contact with grease or oil.

WHISTLES AND JACKKNIVES

Whistles and jackknives—On all ocean and coastwise vessels of over 1,000 gross tons, each person employed thereon by the operator of the vessel shall be equipped with a police whistle and a sailor's jackknife of rugged construction, the blade of which shall be about 3 inches in length, with a sheep-foot point. The handle of the jackknife shall be fitted with a shackle for attaching a lanyard. Such knives and whistles shall be carried, when practicable, attached to life jackets or lifesaving suits. All whistles and jackknives provided for use on merchant vessels on and after January 1, 1944, shall be of an approved type. Such equipment procured prior to January 1, 1944, may be continued in service provided it is in good and serviceable condition.

RIG OF PAINTER UNDER WARTIME CONDITIONS

Under normal peacetime conditions a vessel can be maneuvered and a favorable opportunity taken to launch a lifeboat without any undue haste in the operation. When a vessel is torpedoed, however, and is listing and sinking, conditions change rapidly and a certain amount of confusion exists. It is desired to point out the necessity—if the vessel is making any way through water—of immediately shipping the steering oar and using it to keep the boat alongside. The sea painter, made fast practically in the center of the forward thwart, leads out over the gunwale on the side next to the vessel, and is so rigged to facilitate sheering the boat off from the vessel's side, when necessary to get away. On many occasions, however, it is necessary to hold the boat alongside the ship in order to embark the

crew. Many qualified seamen recommend that a lanyard be attached to a bow shackle or ring at the stem which can be passed around the painter and then hauled tight to hold the boat alongside better during this operation.

It is suggested that drills be held when the vessel is anchored and swung to the tide, and that the crew be instructed in the method and necessity of holding the boat alongside in order that, if occasion should arise to abandon ship, they will not be left clinging to the nets with the boat sheered away from the vessel's side, inasmuch as many lives have been needlessly lost owing to such a condition.

Fetching abreast lifesaving net—The sea painter should be made fast at a point in its length with due regard to the vessel's draft on each particular voyage so that when the boat is in the water and the sea painter is taking the strain, the boat fetches up abreast a lifesaving net.

Rigging-Releasing—Painters should be made fast at the ship's rail in such manner that they may be readily released from that position even if under severe strain. Crews should be thoroughly instructed in the use and purpose of the sea painter and also of the importance of not unhooking the forward fall if releasing gear is not fitted until the sea painter takes some strain. It should also be pointed out to the men that the operation of releasing gear before some strain is on the painter may bring the boat up with a severe jerk, knocking all hands off their feet and otherwise creating confusion. Crews should be shown the method and operation of the strop and toggle and cautioned against releasing the boat if release will allow the boat to drift back under the quarter and perhaps under the propeller, which may still be turning over.

Securing toggle pin—The wooden toggle pin should be attached to the boat by a light line and not to the eye of the painter, as, when it is pulled it may strike someone in the boat as the painter snaps off the thwart.

Additional painter—The additional painter secured to the stem should be neatly coiled clear of the sea painter and available for use after clearing the ship's side.

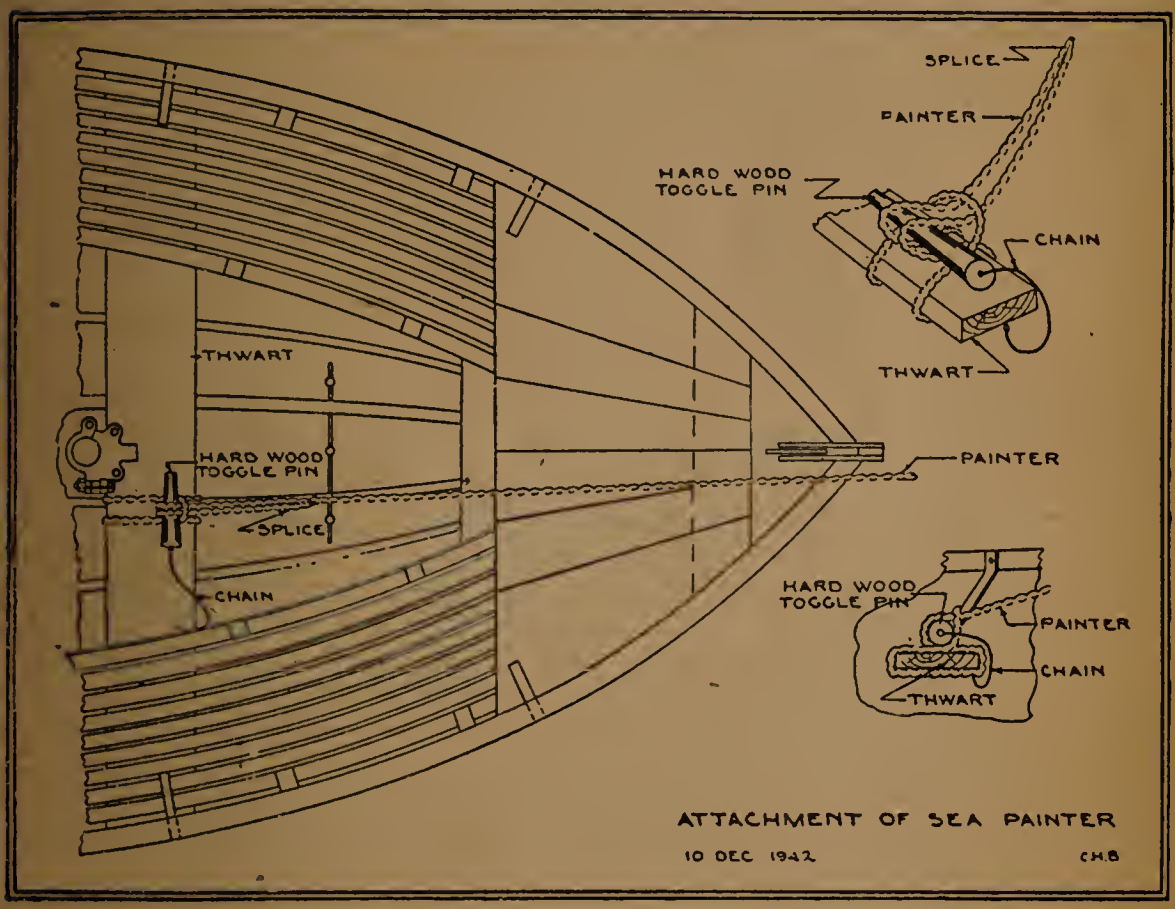


PLATE XII.—Attachment of sea painter in lifeboat.

LIFEBOAT FENDERS—SKATES

Lifeboats on all vessels which are fitted with mechanical means for lowering are equipped with vertical fenders or skates on the inboard side extending from the gunwale well under the turn of the bilge, to facilitate launching on the high side of a listed vessel.

SEA ANCHOR

Purpose—The sea anchor is used to check the boat's way, keeping her end on to the sea to prevent broaching to and capsizing while encountering heavy seas or breaking surf.

Broaching to—The term "Broaching to" means that the boat is being thrown broadside onto the sea, which in all probability would result in the boat capsizing. Thus, if a boat is running before a sea, the first effect of an overtaking sea is to lift the stern and depress the bow. If the boat has sufficient inertia to let the sea pass her, she will in succession pass through the descending, horizontal, and ascending positions as the crest of the sea passes successively her stern, midships, and bow. However, if the boat has not sufficient inertia to allow the sea to pass her, only the first of the three positions, as previously stated, will occur. In other words, the stern is raised high and forced onward by the crest of the sea, while the bow is immersed deeply in the hollow of the sea where the water, being stationary, or comparatively so, offers resistance with the result that the boat is quickly turned broadside to the sea and capsized.

Line—The sea anchor should be employed during periods of rough weather at sea and on approaching the shore through a broken surf. At sea, the sea anchor may be rigged either over the bow or the stern, depending on the circumstances. The additional boat painter in the lifeboat can be used as a holding line. One end of this line is fastened to the swivel or grommet of the sea anchor. The sea anchor is then placed in the water and the holding line paid

out. No specific rule can be laid down relative to the length of holding line to be paid out, as existing conditions, particularly the size of the seas, is the important factor. However, it may be said that as the sea begins to lift the boat and force it, the sea anchor should rest in comparatively dead water, thus affording the best holding qualities. Where chafing is likely to take place, the holding line should be well wrapped with canvas or other chafing gear. The use of oars and steering oar, to handle a lifeboat successfully in conjunction with the sea anchor when experiencing heavy weather, is often necessary.

Emergency sea anchor—If no sea anchor is available, ingenuity may be exercised in constructing a sea anchor from usable boat equipment. The boat bucket, properly slung, an air tank filled with water, or a combination of oar and canvas weighted and properly bridled, are methods suggested.

Storm oil container—In cases where the sea is extremely heavy and much breaking water is encountered, a storm oil should be used. A conical shaped container provided for this purpose is to be inserted through the mouth of the sea anchor, with the pointed end allowed to extend through the opening at the apex of the sea anchor. There are two lanyards provided at the apex of the sea anchor which are to be secured to the two rings attached to the container. Attaching the oil container in this manner will prevent its loss. The cocks at both the large and pointed ends of the oil container are to be slightly opened to allow the oil to seep out slowly. Oil spread on the water in this manner will prevent to some extent the destructive force of breaking seas.

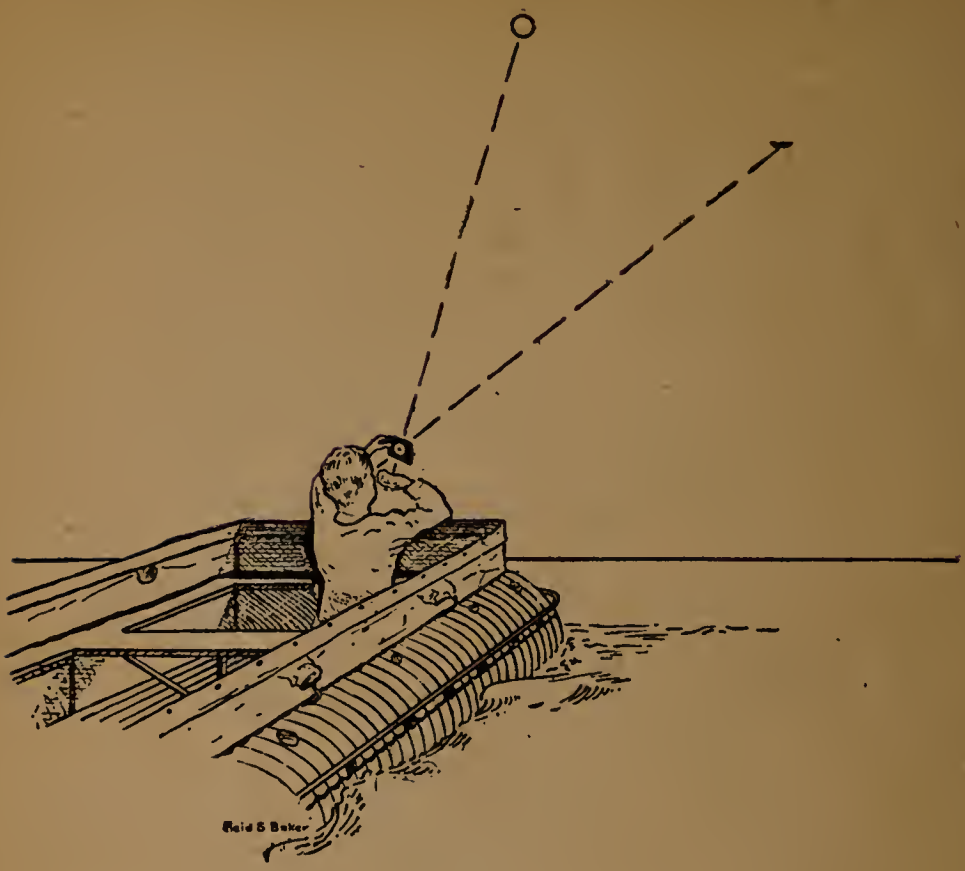


PLATE XIII.—Sighting a signaling mirror.

TO USE SIGNALING MIRROR:

1. Observer should face a point about half way between the sun and the observed object.
2. Hold the mirror in one hand about 4 inches from the face and sight the object to be signaled through the hole in the mirror.
3. Hold the other hand about 12 inches behind the mirror in line with the sun and the hole through the mirror, so that a small spot of light appears on the hand. The small spot of light on the hand is reflected on the back face of the mirror (side toward the observer).
4. Now tilt the mirror so that the spot of light on the back face of the mirror disappears through the hole in the mirror, at the same time keeping the

observed object sighted through the hole in the mirror. With the mirror in this position the light rays from the sun will be reflected to the observed object.

NOTE: When the angle between the sun and the observed object is small the spot of light will appear on the face of the observer, thus allowing both hands to be used in tilting the mirror.

QUESTIONS AND ANSWERS FOR LIFEBOATMEN

Q. How do you know how many persons a lifeboat is allowed to carry?

A. The number of persons allowed is stated on the builder's plate attached to the boat, is painted on the bow of the boat and also on at least two of the thwarts.

Q. How are lifeboats numbered on board a vessel?

A. The boats are numbered from forward toward the stern, odd-numbered boats being on the starboard side (1, 3, 5, 7, etc., in order) and even-numbered boats being on the port side (2, 4, 6, 8, etc., in order). If the boats are nested, No. 1-A is carried under No. 1, No. 2-A under No. 2, etc.

Q. In what part of a lifeboat are the hatchets kept?

A. One is kept at the bow and one at the stern of the boat.

Q. What is a sea painter? Describe its use.

A. A painter of manila rope not less than 2¾" circumference and length three times the distance from the boat deck to the light water line. One end is secured on the second thwart of the lifeboat with a strop eye and toggle so that it may readily be released from the boat and the other end is led well forward outboard of everything and made fast on the vessel in such a position as to allow the lifeboat to ride to the sea painter directly under the davits.

To retain better control of the boat many masters and mates have fitted a strop of manila near the stem which can be passed over the sea painter and the free end passed under a thwart. Between the time the boat hits the water and the instant that all

are on board and it is decided to cast off, the str being pulled taut will more properly tow the bo parallel with the vessel's side. When the officer c lifeboatman in charge is ready to pull away, th strop can be quickly released, the end thrown free. the boat then sheering away when the strain comes directly on the sea painter at the point where it is fast to the forward thwart.

Q. Describe a sea anchor.

A. A sea anchor is a cone-shaped canvas bag. The open end is fastened to an iron ring which keeps the bag spread out. A bridle is attached to the ring and secured to the other end of the bridle is a smaller ring or grommet to which the drag line is made fast. A tripping line of smaller size, but 2 fathoms longer than the drag is attached to the small closed end of the sea anchor and led through a fair lead attached to the iron hoop at the open end. It has been recently determined that it is unnecessary to have the iron ring in the sea anchor since the ring deteriorates the canvas and handicaps proper stowage. Therefore, the iron ring has been dispensed with, sea anchors without rings have been found equally efficient, and the size of sea anchors in lifeboats increased.

Q. How is a sea anchor used?

A. A sea anchor is used as a drag to keep the boat's head to the wind and sea and to prevent rapid drifting. When held by the drag line, with trip line slack, it is wide open and drags through the water with considerable resistance. A container of storm oil, having a small opening for the continuous discharge of the oil, may be secured to the sea anchor.

Q. How is a sea anchor hauled in?

A. A sea anchor is hauled in by its tripping line which upsets it so that it is brought in small end first with greatly reduced resistance to its passage through the water.

Q. What may be used in lieu of a sea anchor?

A. A tarpaulin or anything similar may be attached to some oars lashed together, one edge being weighted down by attaching to it any heavy object and, after bridling the whole so that it will drag

as nearly upright in the water as possible, it may be used very effectively in lieu of a sea anchor.

Q. What oil is used as storm oil?

A. Animal or vegetable oil is used whenever available, although fuel oil will be effective if the water temperature is fairly high. The effect of any oil is less at lower temperatures of the water.

Q. What is the effect of storm oil?

A. Storm oil does not lessen the size of seas, but does tend to prevent them from combing or breaking. It will usually be of aid in any sea in which a lifeboat can live.

Q. What are the parts of an anchor?

A. The parts of an anchor are stock, shank, fluke, crown, arm, and shackle or ring.

Q. What are the parts of an oar?

A. The parts of an oar are the handle or gripe, leather, loom, blade, and tip.

Q. Of what wood are oars usually made?

A. Ash, but any wood of equal length of grain and equal strength may be used, such as beech, birch, etc. Racing oars are usually made of spruce.

Q. What is the usual size of boat falls?

A. The manila line used is usually from 2 to 4 inches in circumference, depending on the size and weight of the boat. With a threefold purchase, the standing part is rove over the center sheave. On all ocean, coastwise, Great Lakes, and on new bay and sound passenger vessels, wire falls and mechanical means for lowering boats are required if the height of the boat deck exceeds 20 feet from the lightest seagoing draft.

Q. Why are lifeboats usually "double enders"?

A. "Double-end" boats are more seaworthy. They are less likely to ship water in a following sea, and less likely to broach to. They are easier to steer in a following sea, easier to handle alongside a vessel, and much easier to handle in a surf.

Q. What is a frapping line?

A. A frapping line is any piece of line passed around a boat fall above the lower block, one end being made fast on deck and the other being hauled taut and belayed to prevent the boat from swinging.

Q. Which oar is the stroke oar in a lifeboat?

A. The oar nearest the stern in a single-banked boat. In a double-banked boat, the port and starboard oars nearest the stern are both stroke oars.

Q. If you were in charge of a lifeboat, how would you proceed to get the boat launched and away from the ship under oars?

A. Muster the crew; see that they all have on life preservers properly adjusted; remove the boat cover and strongback; hang the ladder over the side; have one bow and one stroke oarsman get in the boat and see that the plug is in or that the automatic bailer is free, and that the life lines are clear; have the painter led well forward outside of the davits and tended; let go all gripes and the boat chocks; remove the reel covers; tend the falls; slack davit guys and swing the boat out; set davit guys taut and belay; have stroke oarsman place steering oar in readiness; place all crew in boat, station two men at each fall, one to see that falls are kept clear and one to lower; lower away on both falls evenly; have bow and stroke oarsmen ready with boathooks to fend off from vessel's side; trip releasing gear as soon as boat is water-borne; take passengers aboard, either at embarkation deck or after boat is in water, seeing that they all have on properly adjusted life preservers; shove boat's bow off and have crew commence rowing, giving them the following orders: "Let go the painter"; "stand by your oars"; "up oars"; "let fall"; "give way together." If the boat is under radial davits, guy the boat out as described above; if under quadrantal davits, crank the boat out; if under gravity davits, place one hand on brake lever, raising it slowly, keeping the boat well under control, and permit the boat to roll down the runway, controlling it by frapping lines.

Q. How would you launch a boat in a heavy seaway?

A. The vessel should first be hove to on a heading that will reduce the roll and which will offer as good a lee as possible for the boat to be launched. Some vessels are better in the trough, some with the sea

on the bow, and some with a quartering sea. A boat may be launched with care by a well-drilled crew under adverse conditions. If the boat is not fitted with skates, mattresses should be slung up and down the side. Prior to lowering, oil should be used over the vessel's side so that the oil will keep spreading. If the vessel is rolling, the boat itself should be kept from swinging as much as possible by frapping lines until ready to lower. If the vessel is pitching, the boat should be kept from swaying by keeping the painter taut and by using a stern fast in the same manner or by giving the frapping lines a slight fore and aft lead. When ready, the frapping lines should be tended, the boat should be lowered away smartly, the releasing gear should be tripped as soon as the boat is water-borne, and the boat should be sheered off immediately from the vessel's side by using the steering oar and sea painter.

Q. If you were in charge of a lifeboat, how would you prevent it from swinging as the vessel rolled when the boat is at the embarkation deck?

A. By the use of frapping lines passed around the falls above the lower block. A slight fore and aft lead can be given the frapping lines if necessary to prevent swaying.

Q. What are the most important things to be done before a boat is lowered?

A. Make sure that the drain plug is in place, and that the painter is carried forward and tended.

Q. In a lifeboat which is not equipped with simultaneous releasing gear, which fall should be unhooked first?

A. If the vessel is stationary or has headway, the after fall should be unhooked first. If the vessel has sternway, the forward fall should be unhooked first.

Q. If you were in charge of a lifeboat, how would you proceed to come alongside a gangway under ordinary conditions, and what orders would you give?

A. Come up to the vessel from astern so that the boat is parallel to the vessel when about 100 yards from the gangway, and then give the order "In bows," whereupon the two bow oarsmen boat their

oars and stand by with boathooks; when the boat is about two boat lengths from the gangway, give the order "Oars," followed by "Boat your oars," whereupon all of the oars are boated; next sheer the bow in toward the gangway and, when it nearly touches, shift the helm and sheer the bow out, bringing the stern in. Due regard, of course, must be had for wind, tide, and sea. It is customary to have a painter ready at hand at the gangway, and led well forward on the vessel, for use in moderate weather.

Q. If you were in charge of a lifeboat, how would you proceed to put it aboard under ordinary conditions?

A. Bring the boat alongside the vessel under the davits; get the painter and make it fast; send all of crew except one bow and one stroke oarsman on board by the ladder; have bow oarsman hook on forward fall, then have stroke oarsman hook on after fall; immediately thereafter commence hoisting; if both falls are not led to the same winch, see that boat comes up evenly; as soon as boat is clear of water, have stroke oarsman pull drain plug; when two-blocked, pass stoppers and belay falls; then proceed to take boat in on deck according to type of davit used, the process being the opposite of that used in launching.

Q. What boats are always kept ready for immediate launching?

A. The emergency boats. These boats are of suitable size, built for use under all conditions of wind and sea in an emergency, such as rescue of man overboard, rescue of persons from a wreck, carrying out lines, etc. Generally they are of whaleboat type with finer lines than the ordinary lifeboat.

Q. How would you place passengers in a lifeboat?

A. So that the boat is on an even keel and the weight equally distributed fore and aft, and so that the handling of the oars is not interfered with; and with the women and children in the center of the boat so as to protect them as much as possible from spray.

Q. What is the meaning of the order "Back water?"

A. To do with the oar the opposite of what is done in rowing, or, in other words, to row backwards.

Q. What is the meaning of the order "Stern all?"

A. To take the way off a boat which has headway. To carry out the order, the blades of the oars are dipped very slightly in the water on the backstroke only for a few strokes, and the depth to which the oars are dipped is increased gradually as way is lost, until finally the blade is submerged to the same depth as in rowing ahead. When way is off the boat, a well-drilled crew will commence without further orders to "Back water."

Q. If you were hove to by the sea anchor and the dragline carried away, how would you keep the boat's head up to the wind and sea?

A. By using the oars.

Q. When steering a boat by compass, where should the compass be placed?

A. Aft where it is convenient for the man steering the boat to see, and secured so that the lubber's line is as close to the center line of the keel as possible.

Q. If you were heading for a particular place or point of land and fog shut in, what would you do?

A. As soon as signs of fog appeared, take a compass bearing of the place or point and then steer by compass.

Q. How is the life preserver light, when worn by a man in the water, distinguished from the lights on rafts and floats?

A. Red light is utilized to distinguish men from rafts and floats which show a white light. Men will not then be swimming towards each other.

Q. What lights should you display on a lifeboat at sea at night?

A. From sunset to sunrise, the boat's lantern hoisted as high as possible on the mast or on a spare oar.

Q. When using one of a vessel's motor lifeboats as a means of transportation from an anchorage to the shore in the conduct of ship's business, what

additional equipment is required in order to comply with the Rules of the Road?

A. When a lifeboat is used as a means of routine transportation, it loses its emergency nature and comes into the same category as any other motorboat. As such and during such employment a motor lifeboat is subject to the applicable provisions of the Motorboat Act in United States waters, and of the International Rules elsewhere. Therefore, applicable requirements as to LIGHTS, WHISTLES and BELLS should be complied with since the fact that these are not part of the required equipment as a lifesaving measure does not exempt a boat from the necessity of possessing them if it is otherwise used.

Q. What would you do in a lifeboat at sea at night if you saw the lights of a vessel and you desired assistance?

A. Use a distress light until an answer is received. If the vessel is a considerable distance off, use the signal pistol until an answer is received.

Q. Adrift in a lifeboat at sea what equipment could you utilize to signal, or attract, an airplane or vessel?

A. (1) Radio, if so equipped.
(2) Signal pistol and parachute flares.
(3) Distress flares.
(4) Signal flag.
(5) Smoke signals, 4.
(6) Signaling mirrors, 2.
(7) Flashlight.
(8) Lantern.
(9) Sails, red or chrome yellow.

Q. What is the Coast Guard signal meaning "Do not attempt to land in your own boats?"

A. By day, a red flag and a white flag waved together; by night, a red lantern and a white lantern waved together.

Q. What is the Coast Guard signal meaning "This is the best place to land?"

A. By day, a man beckoning on the beach; by night, two torches burning near together on the beach.